The Oral Health and Psychosocial Needs of Scottish Prisoners and Young Offenders

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THE ORAL HEALTH AND PSYCHOSOCIAL NEEDS OF SCOTTISH PRISONERS AND YOUNG OFFENDERS MAIN REPORT 2019

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NHS Dumfries & Galloway

NHS Forth Valley

NHS Grampian

NHS Highland

NHS Lanarkshire

NHS Lothian

NHS Tayside

Scottish Oral Health Improvement Prison Programme (SOHIPP)

THE ORAL HEALTH AND PSYCHOSOCIAL NEEDS OF SCOTTISH PRISONERS AND YOUNG OFFENDERS MAIN REPORT 2019

Foreword by Tom Ferris, Chief Dental Officer, Scottish Government

'Self-Portrait with toothache' HMP Grendon, 2009. Courtesy of the Koestler Trust, Registered Charity.

Foreword

This 3rd Scottish Report on Oral Health in Prisons is part of the monitoring of the oral health and psychosocial needs of people in prison in Scotland from 2002 to 2019. In addition to assessing the oral and dental health of prisoners it supports the evaluation of policy change in 2011 and the introduction of the Mouth Matters Oral Health Improvement Programme in 2014.

There have been improvements in access to and acceptability of dental services following their transfer to the Public Dental Service of NHS Boards, following the policy change of 2011. Introduction of the Scottish Government's Mouth Matters programme in 2014 has resulted in improved gum health, toothbrushing behaviours and more positive attitudes towards oral health. However, it is disappointing that the levels of tooth decay in 2019 remain high. As an important marker of deprivation and health inequity this demonstrates the persistence of underlying social determinants of health to reduce the benefits of improved dental service provision. The surveys of 2002, 2011 and 2019, therefore, by placing oral health in the centre of health and social care policy provide a means not only of monitoring oral health but also demonstrating that oral health acts as a marker of the health and social inequities experienced by people in prison.

The recommendation to introduce multidisciplinary working within and across the prison estate, will mean that the work of Public Dental Service's clinical and health promotion teams will be central to strategies to improve the oral health and the health of those in custody. Acknowledging the role of the social determinants of health on the oral health status of people in prison permits the use of decay experience as a marker of inequity. Furthermore, the recommendation to support current peer oral health improvement interventions to promote health and well-being of people in prison during their sentences, will enable them to maximise their capabilities and take control over their lives.

I commend this report to all those working with people in prison to help ensure that they are able to maintain and improve their oral health, health and psychosocial well-being during custody, on liberation and beyond.

Tom Ferris
Chief Dental Officer, Scotland

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1

Executive Summary

1.1 Background

In March 2005, the Scottish Executive Health Department's 'An Action Plan for Improving Oral Health and Modernising NHS Dental Services in Scotland' (Scottish Executive, 2005) was published in response to the two consultations documents, 'Towards Better Oral Health in Children' (Scottish Executive, 2002) and 'Modernising NHS Dental Services in Scotland' (Scottish Executive, 2003). The two main areas of the Dental Action Plan were to focus on the improvement of oral health of the Scottish population and to identify specific priority groups needing additional support to improve their oral health. Prisoners were identified as a group of individuals requiring enhanced support to achieve and maintain their oral health.

By 2007, the Prison Healthcare Advisory Board recommended the responsibility for the healthcare of prisoners including oral health should be transferred from the Scottish Prison Service to NHS Scotland and specifically to the NHS Boards in which the prisons were located (Prison Healthcare Advisory Board, 2007). In August 2010 a legislative amendment to enable the transfer of responsibility was passed by the Scottish Government, and by October 2011 the memorandum of understanding ensured that the responsibility of healthcare in prisons became the responsibility of the NHS Boards (NHS Scotland, 2011). The common purpose of this policy was to 'improve prisoners' access to an appropriate range and quality of health services based on their needs.' The intention being to ensure equity in healthcare delivery and access. In order to achieve this aim, partnership working was highlighted as of central importance, with continuous professional education for all those working within the prison sector.

The health of prisoners has been described as 'poor', reflecting marked health inequities associated with the so-called cliff-edge of inequalities (Aldridge *et al.*, 2018). The first Health Promotion Strategy to promote health among prisoners in Scotland, 'The Health Promoting Prison' was published in 2002 (Scottish Prison Service, 2002). Later, in 2008, the Scottish Government's 'Equally Well' (Scottish Government, 2008) report of the Ministerial Taskforce on Health Inequalities highlighted the need to put in place a programme to improve the oral health of prisoners. Therefore, by 2012, the publication of 'Better Health, Better Lives for Prisoners' (ScotPHN, 2012), a framework to support a new partnership between the SPS and NHS Boards was published. This framework promoted the adoption of a 'whole prison approach' focussing on three key elements for [1] developing health promotional policies, [2] promoting a healthy prison environment and [3] the promotion of prevention, health education and other health promotion initiatives to address the health needs of people in prison. Oral health was placed as a central and integral part of 'Better Health, Better Lives for Prisoners'.

In 2011 a survey of the Oral Health and Psychosocial Needs of the Scottish Prisoners and Young Offenders was conducted by the Scottish Oral Health Improvement Prison Programme in conjunction with NHS Boards (Freeman *et al.*, 2013). The results of the 2011 SOHIPP report led to the development of the 'Mouth Matters' oral health promotion intervention for people in custody (Freeman *et al.*, 2014). This Scottish Government, national oral health initiative aimed to promote oral health improvement for people in prison in Scotland supported by the NHS Boards' oral health improvement teams. The Mouth Matters Guide for Trainers was specifically designed to support the health

professionals, prison staff and support workers to meet the detailed oral health needs of the Scotland's prison population.

In 2017 the SPS announced its intention for all prisons in Scotland to be smoke free by the end of 2018 (Scottish Prison Service, 2017) and to support this policy NHS Health Scotland published a Smoke-free prisons pathway and highlighted 'peer support' as a key step in the pathway (NHS Health Scotland, 2018). At this time and following a qualitative exploration of the participants' oral health concerns (Freeman *et al.*, 2013) the Mouth Matters intervention adopted the concept of the 'peer support model' to develop a peer oral health mentoring intervention in Scottish Prisons. SOHIPP in collaboration with NHS Forth Valley and HMYOI Polmont developed the Mouth Matters Peer Oral Health Mentoring Programme. With Anne Crowe, NHS Education Scotland an SQA level 5 award in Oral Health Improvement Mentoring (Scottish Qualification Authority, 2018) was achieved in 2018, for those undertaking the peer mentoring training. Therefore, Mouth Matters was considered as an important peer support intervention to support the smoke-free prisons agenda and was included as a key initiative for Smoke-Free Prisons by NHS Health Scotland (NHS Health Scotland, 2018).

The 2011 Oral Health and Psychosocial Needs of the Scottish Prisoners and Young Offenders, thus, serves as a benchmark for the assessments of quality, appropriateness and accessibility of dental health care within Scottish prisons following Scottish Government and SPS policy changes between 2011 and 2020. The 2019 Oral Health and Psychosocial Needs of the Scottish Prisoners and Young Offenders is both timely and appropriate to: 1) assess the health and oral health of people in custody, 2) identify the effect of healthy public policies on their oral health and psychosocial health status and 3) serve as a benchmark for future assessments of the quality, appropriateness and accessibility of dental health care within the Scottish prisons.

1.2 Aims and Objectives

The aim of the 2019 survey was to [1] conduct an oral health and psychosocial needs assessment of people in custody in 10 prisons across Scotland and [2] compare the findings of the 2019 survey with the 2011 survey to provide evidence-based recommendations to inform oral health policy and strategy to promote the oral health and psychosocial wellbeing of those in prison.

The specific objectives were to:

1. Conduct an oral health survey of people in prison;
2. Examine their health and oral health behaviours;
3. Assess their dental anxiety, oral health-related quality of life and depression;
4. Compare the findings of the 2019 with the 2011 survey results to examine the effect of:
   (i) Change of policy of the transfer of responsibility of healthcare from SPS to NHS in 2011 on dental decay experience;
   (ii) Introduction of the Mouth Matters intervention in 2014 on toothbrushing behaviours, plaque scores, dental visiting and dental health attitudes.
5. Make recommendations to inform oral health strategy to promote the oral health of those in prison.

1.3 The main findings of the 2019 Oral Health and Psychosocial Needs of Scottish Prisoners and Young Offenders

A total of 353 prisoners took part in the survey, which was conducted in HMP Dumfries (15), HMP Cornton Vale (35), HMYOI Polmont (152), HMP Grampian (5), HMP Inverness (10), HMP Shotts (14), HMP Addiewell (20), HMP Edinburgh (47), HMP Castle Huntly (15) and HMP Perth (40)[1].

Demographic profile

Age, ethnicity and employment status: The mean age of the participants was 32.10 years. Their age ranged from 16 to 83 years. Ninety four percent were Caucasian, while the remainder stated that they were of Black (6), Mixed Race (5), Asian (3), Chinese (2), Lithuanian (1), Middle Eastern (1), Romanian (1) and Vietnamese (1) ethnicities. Sixty three percent were unemployed prior to their current imprisonment, 30% reported being in employment, 3% in formal education and 1% in training.

Marital status and living experience: Seventy-six percent of the prisoners stated they were single. Forty-seven percent reported they had children and 19% stated that they were living together as a family prior to their current imprisonment. Twenty-three percent of participants had been in children's institution or 'in care' and 12% had been in foster care. Thirty-two participants stated that they had experience of both children's institutions and foster care. Thirty-nine percent stated that they had experienced homelessness at some point in their lives, with 46% of those who had experienced homelessness reporting they had been homeless for less than six months; 24% for six months to under 12 months and 17% had been homeless for over 24 months.

Profile of prison experience

At the time of the 2019 survey, participants reported they had spent on average 2.90 years (95% CI: 2.30, 3.48) of their lives in prison. One hundred and twenty-nine prisoners (56%) had been on remand at least twice. The mean number of reported prison remands was 3.45 (95% CI: 2.94, 3.95) with the range being between one and 25. One hundred and fifty-one prisoners (54%) had at least one previous prison sentence, with the number of sentences experienced ranging from one to 25. The mean number of imprisonments was 2.74 (95% CI: 2.28, 3.20). One hundred and sixty-four (52%) participants stated that their current imprisonment was for a short-term period (four years or less); 152 (48%) stated being on longer-term sentences (five years or more).

Health and Health Behaviours

Health status: The vast majority (99%) of the prisoners answered the medical history questions. Forty-four percent of prisoners stated that they suffered from at least one of the illnesses mentioned on the medical history questionnaire, ranging from cardiovascular disease to allergies. Equivalent proportions of prisoners who participated in the 2019 survey had diabetes (3%) and epilepsy (3%) compared with the findings of the Health in Scottish Prisons Report of 2007 (Graham, 2007).

Gender differences in health were noted in the reported experience of communicable and non-communicable diseases. Woman prisoners reported greater ill-health than adult male prisoners for all health conditions except for cardiovascular diseases. With regards to communicable diseases

[1] Since the prisons sampled were predominately for adult men, women and male young offenders, the variable 'prison category' was calculated and used as an explanatory variable to explain differences in age and gender

greater proportions of females (3%) reported having HIV/Hepatitis C infection compared with male prisoners. This finding is supported by the work of Taylor *et al.*, (2012).

Prescribed medications: One hundred and ninety-eight respondents (59%) stated that they had been prescribed medication and 167 provided details of the medication prescribed. Of those who provided details of their prescribed medication, 71% were psychotropic preparations: 40% anti-depressants, 20% anxiolytics and 11% antipsychotics. Of the other named medications, 31% stated they were prescribed analgesics, 17% cardiovascular medication and 16% stated they had been prescribed methadone and anti-epileptics.

Health Behaviours: Forty-four percent (152) of the sample reported that they either smoked tobacco (n= 136) or used electronic cigarettes (n= 16). The mean number of cigarettes smoked daily (outside of prison) was 18.21 (95% CI: 16.38, 20.04). Fifty-four of the prisoners stated that they smoked between 11-20 cigarettes per day when living outside of prison. The number of cigarettes smoked outside daily did not vary by gender or age.

Seventy-four percent (255) respondents stated that they had a history of drug use, with 21% (71) stating that they had used intravenous drugs. Previous drug use and injecting drug use varied significantly by prison category. Eighty two percent of male young offenders stated that they had previously used drugs compared with 81% female prisoners and 63% male prisoners. However, a history of injecting drug use was highest among female prisoners (45%) compared with adult male prisoners (18%) and male young offenders (5%). This finding is supported by Taylor *et al.*, (2012), which showed 59% of women with a reported history of injecting drug use compared to 30% men among Scottish prisoners. Prisoners who stated that they had experienced homelessness were significantly more likely to have used and injected drugs. Drug-taking behaviour also varied by prison experience, with prisoners with greater experience of prison remand and sentences stating that they had a history of drug use and injecting drug use. Prisoners with a current shorter sentence (4 years or less) stated they had injected drugs.

Fifty-three (15%) prisoners reported that they had taken part in a drug rehabilitation programme. Eight percent of the entire prisoner sample stated they had been prescribed methadone, suggesting that they were on a maintenance programme. These figures are lower than reported by the SPS Prisoner Survey 2017 (Carnie *et al.*, 2017) wherein 20% of the prisoners reported being prescribed methadone, of which 48% were on a maintenance programme. Participation in a drug rehabilitation programme varied in accordance with prison category and prison experience. Greater proportions of female prisoners (30%) compared with adult male (14%) and male young offenders (5%) stated they had taken part in a drug rehabilitation programme. This finding is supported by earlier work from HM Inspectorate of Prisons (2007), which found that 33% females compared with 6% males had taken part in drug maintenance programme (HM Inspectorate of Prisons, 2007). Prisoners with greater experience of remand and sentences were more likely to have taken part in a drug rehabilitation programme.

Psychosocial health

Dental anxiety: This sample of prisoners had an equivalent prevalence of dental anxiety as reported for the UK general population (Hill *et al.*, 2013). Thirteen percent of the sample were identified as being extremely dentally anxious as assessed by the Modified Dental Anxiety Scale (MDAS). Larger proportions of participants were extremely anxious about having a local anaesthetic injection (13%) and having their teeth drilled (12%). Female prisoners compared with male prisoners and male young offenders were more anxious of all aspects of dental treatment. Dental anxiety scores did not vary by prison experience.

Oral health related quality of life: Oral Health-related Quality of Life (OHRQoL) was assessed by the Oral Health Impact Profile-14 (OHIP-14). The mean OHIP-14 total score for prisoners in this sample was 14.42, which was lower than that reported for prisoners in England (17.8) (Marshman *et al*., 2014). The oral health impact of physical pain (painful aching in the mouth) was highlighted as being experienced occasionally by all prisoners in the 2019 survey. The impacts of psychological discomfort (feeling self-conscious about the appearance of teeth) and psychological disability (feeling embarrassed about the appearance of teeth) were experienced very often by 23% and 20% of the sample respectively. Female prisoners had higher mean OHIP-14 scores compared with male prisoners and male young offenders, suggesting that they experienced more oral health impacts and had poorer OHRQoL. The grouping variable 'prison category' significantly explained differences in the mean scores of individual items of the OHIP-14 scale for all items except for 'trouble pronouncing any words'. Women prisoners compared with adult male prisoners and male young offenders felt more self- conscious about the appearance of their teeth. Prisoners who were serving shorter prison sentences of four years or less had higher mean scores for the oral health impacts of 'difficulty in doing usual jobs' and 'unable to function' than those serving longer sentences.

Depression: Depression was measured using the Center for Epidemiologic Studies Depression Scale (CES-D). One hundred and thirty-nine participants (39%) scored 16 or above, suggesting that they were suffering from a depressive illness. The prisoners' experience of depression as measured by the CES-D in the 2019 survey compared unfavourably to the prevalence for depression of 11% for the general population of Scotland, 2016/17 (McLean *et al.*, 2018).

Female prisoners had significantly higher mean total CES-D scores than male prisoners and male young offenders. Female prisoners compared with male prisoners and male young offenders were more likely to experience depressive symptoms such as 'bothered by things', 'poor appetite', 'couldn't shake off blues', 'trouble keeping mind on task', 'felt depressed', 'everything was effort', 'fearful', 'crying spells', 'felt sad', 'people dislike me' and 'could not get going'. These findings are supported by the work of Bastick and Townhead, (2008) and Fazel and Seewald, (2012) that showed that women prisoners had a higher prevalence of mental health problems than male prisoners.

Mental health problems are reported to be both a cause and a consequence of imprisonment (Penal Reform International, 2007). Mental health has also been shown to fall with imprisonment, with the length of imprisonment having little effect on mental health status (World Health Organization, 2009). However ,in the 2019 survey, prisoners with shorter prison sentences had higher mean scores for CES-D items as 'was happy' and 'enjoyed life' compared with prisoners with longer sentences and those with greater experience of remands who had higher mean scores for CES-D items as 'people dislike me' and 'could not get going' than others.

Oral Health and Oral Health Behaviours

Dental attendance and dental treatment experience: Seventy-four percent of participants stated that they had attended a dental practice either inside or outside the prison within the previous year and 15% reported that they had attended a dental practice within a two years period. The reasons for dental visits included trouble with teeth or gums (48%), routine dental examination (35%), other reasons (11%) concerning issues with scale and polish or dentures.

Seventy-eight percent of prisoners stated that they had accessed dental services inside the prison but experienced barriers to attending. Barriers to accessing dental services inside the prison included: difficulty in accessing the dental service in the prison (appointment) (40%), the infrequent nature of the dentists treatment schedules (32%), disliking the prison dental service (6%), difficulty in getting a request form (5%) and difficulty in completing a request form (3%). Twenty-four percent stated they

were ‘dental anxious’, ‘not liking dentist in general’ or ‘feared going to dentist’ and had experienced ‘unsatisfactory previous treatment’.

With regards to their experience of dental treatment the most stated dental treatments were local anaesthetic injections, fillings, x-rays and scale and polish. Comparison of dental treatments by prison category showed that a greater proportion of adult males compared with females and male young offenders received fillings and extractions. With regards to preventive treatment, lower proportions of male young offenders stated that they had scale and polish and fluoride treatment compared with adult male prisoners and female prisoners. Prisoners with longer prison sentences of five years of more stated that they had more extractions, dentures and scale and polishes compared with prisoners with shorter sentences of four years or less.

Dental decay experience: Three hundred and forty-eight prisoners had an oral examination. The mean $D_{3CV}MFT$ was 13.70 (95% CI: 12.75, 14.64): the mean number of decayed teeth ($D_{3CV}T$) was 2.93 (95% CI: 2.56, 3.29): the mean number missing teeth (MT) was 6.68 (95% CI: 5.80, 7.56): the mean number of filled teeth (FT) was 4.09 (95% CI: 3.69, 4.50). The care index was 30%.

Differences in dental decay experience varied with prison category, reported experience of remands, number of sentences and length of current imprisonment. Women prisoners had greater mean dental decay experience and missing teeth due to tooth decay compared with adult male prisoners and male young offenders. Male young offenders had greater mean numbers of decayed teeth than female and adult male prisoners, whereas adult male prisoners had greater mean number of filled teeth compared with female prisoners and male young offenders.

Prisoners with greater experience of remand, sentences and longer current imprisonment had increased dental decay experience. With regards to decayed teeth, prisoners with greater experience of remand and shorter current sentences had greater numbers of decayed teeth. Prisoners with longer current sentences had higher mean number of filled teeth compared with prisoners with short term sentences. The mean number of missing teeth did not vary by prison experience.

Differences in dental decay experience were also observed in prisoners with regards to prescribed medication, those with a history of drug use and drug rehabilitation. Those prisoners who stated that they were prescribed medication at the time of the survey had greater dental decay experience and greater numbers of missing teeth and filled teeth. Prisoners with a history of drug use, injecting drug use and drug rehabilitation had increased mean numbers of decayed teeth. The mean number of filled teeth was higher among prisoners with no history of drug use. Prisoners with history of injecting drugs and drug rehabilitation had higher numbers of missing teeth due to caries.

Periodontal health: plaque scores: On average plaque covered less than a third of the total tooth surfaces examined, suggesting that good oral hygiene was maintained by the prisoners in this sample. The amount of plaque present varied by prison category, therefore, male young offenders had lower mean plaque scores compared with female and adult male prisoners. Prisoners who reported that they brushed their teeth with fluoride toothpaste whilst in prison had significantly lower mean plaque scores compared with those who stated they did not brush. The amount of plaque present did not vary by prison experience. It may be suggested that the routine of prison life may provide a supportive environment for the adoption of toothbrushing and oral hygiene behaviours.

Oral mucosa, functional dentition and dentures: Six areas of the mouth and throat were examined for the presence of oral lesions for monitoring and referral. These areas were the lips, the buccal mucosa (cheeks), the tongue, the floor of the mouth (under the tongue), the palate and fauces (throat). Twenty-nine (8.3%) participants had at least one lesion that required to be monitored or

referred. Lesions on lips (16), buccal mucosa (6), palate (3), tongue (2) and floor of the mouth (2) required monitoring. One female participant required immediate referral for lesion on the buccal mucosa.

Seventy five percent of participants had at least 20 standing teeth and were considered to have a functional dentition, 22% had a shortened dental arch and 4% were edentulous. Larger proportions of male young offenders (97%) compared with adult males (69%) and females (59%) had 20 or more standing teeth. With regards to prison experience, lower proportions of prisoners with longer current prison sentences had 20 or more standing teeth.

Eighty-seven (25%) prisoners reported that they had been provided with some kind of denture at some point in their life. Of those who had an oral examination, 55 (16%) participants were wearing complete and/or partial dentures. Dentures were made of acrylic or metal with support obtained from tissues and tooth or both. Five dentures in the upper arch needed repair. With regards to denture care and hygiene, a greater number of participants reported cleaning their dentures inside the prison compared to cleaning it outside when at home. More female prisoners stated that they cleaned their dentures inside the prison than when liberated and at home, however, more male prisoners reported that they left their dentures out at night while in prison than when outside of prison. This once more suggests that the routine of prison life may provide a supportive environment for the adoption and maintenance of oral health behaviours.

1.4 Synopsis of the 2019 findings

The 2019 survey examined the health, psychosocial health and oral health of three groups of people in custody across 10 Scottish prisons. The aim of the survey was to use this information to provide recommendations to inform the oral health strategy to promote the oral health of those in prison.

The demographic findings of the prisoners in the 2019 survey showed that they were overwhelmingly younger (mean age 32 years), belonged to the 'white' ethnic group (94%) and were unemployed prior to imprisonment (63%), suggesting no change in their demographical profile from that reported by Graham in 2007 (Graham, 2007) and SPS Prisoner Survey 2017 (Carnie *et al.*, 2017). With regards to the prison experience some similarities in custodial sentence and length of current imprisonment were noted with the SPS Prisoner Survey 2017 (Carnie *et al.*, 2017). The majority of the prisoners in the 2019 survey reported having been on remand (74%) and sentenced (85%) between one and five times, and greater proportions of prisoners (52%) stated that their current length of sentence was for four years or less.

Despite the transfer of responsibility of healthcare from the SPS to the NHS in 2011 only 41% of responders in the 2019 survey stated that they had attended primary and/or secondary level medical services, whereas over 70% of responders in the SPS Prisoner Survey 2017 stated they had attended both nurse and a doctor or seeking medical care (Carnie *et al.*, 2017). The prevalence of self-reported illness such COPD/asthma among prisoners in the 2019 survey was equivalent to that of the Scottish general population (McLean *et al.*, 2020) whereas the prevalence of hypertension and diabetes was lower than for the Scottish general population (McLean *et al.*, 2018; McLean *et al.*, 2020). The prevalence of HIV/Hepatitis C and injecting drug use was higher among female prisoners (Taylor *et al.*, 2012). Nearly 15% of the respondents stated that they had taken part in a drug rehabilitation programme and only 8% of the sample stated that they had been prescribed methadone. Although it is not possible to make a direct comparison, these figures are lower than reported by the SPS's Prisoner Survey 2017 (Carnie *et al.*, 2017) wherein 20% of the prisoners reported being prescribed methadone of which 48% were on a maintenance programme. Forty-two percent of the sample stated

that they either smoked tobacco or used electronic cigarettes. As the data for the 2019 survey were collected after the smoking ban in November 2018, therefore those who reported smoking were presumably doing so outside the prison. Interestingly, this prevalence is lower than reported by the SPS's Prisoner Survey 2017 (Carnie *et al.*, 2017) (68%) but higher than the Scottish general population (17%) (McLean *et al.*, 2018).

With regards to dental anxiety, 13% of the sample were identified as being extremely dentally anxious, equivalent to the population norm for the UK (Hill *et al.*, 2013). Female prisoners were more dentally anxious than male prisoners or male young offenders. Similarly, oral health related quality of life of women prisoners was poorer than male prisoners or male young offenders. Female prisoners had worse psychosocial health as assessed by having greater dental anxiety, poorer quality of life and increased depressive symptoms compared with male prisoners and male young offenders.

Over a third of the sample (39%) scored 16 or above on the CES-D scale and 40% of those who provided details of their medication had been prescribed anti-depressants. The mental health of prisoners was poorer than that of the general population in Scotland (McLean *et al.*, 2018). More women than adult male prisoners or male young offenders had increased depressive symptoms. A careful examination of the psychosocial health of people in custody would suggest a need for gender specific interventions to address the psychosocial needs of women in prison.
A change in dental health attitude was noted, with the majority of the prisoners wishing to have their front and back teeth restored, together with an interest in knowing what the dentist was going to do and why.

The oral examination showed that the prisoners in this sample had increased numbers of missing teeth and fewer filled teeth, a pattern previously reported in the Scottish Prisons' Dental Health Survey of 2002 (Jones *et al.*, 2004) and 2011 (Freeman *et al.*, 2013). However, the overall burden of dental disease was overwhelmingly higher than that reported in the Scottish Adult Oral Health Survey 2016-2018 (Information Services Division, 2019b). The dental decay experience was significantly higher for female prisoners, those who were on prescribed medication and those with a history of injecting drug use. When dental decay experience was explored by prison experience, those prisoners that stated that their current length of imprisonment was for five years or longer had lower mean numbers of decayed teeth, higher mean numbers of missing teeth and filled teeth than those on short term sentences of less than four years. This finding suggests that the prisoners' decayed teeth were being converted into missing and filled teeth and that they had received dental treatment inside the prison. Interestingly, the proportion of prisoners stating that they had accessed prison dental services was higher (78%) than those stating that they had ever accessed dental services either inside or outside the prison (74%). Most of the participants stated they had received dental treatments such as fillings, (90%) extractions (77%) and preventive treatments such as scale and polish (74%) at some point in their life. With fewer respondents stating they had received preventive treatments such as fissure sealants and fluoride treatment. Among dentate participants total plaque coverage for this sample covered no more than one third of the total tooth surfaces examined and those who brushed their teeth inside the prison had significantly improved oral hygiene.

It may be reasonable to suggest that the change in dental service provider has affected dental attitude and it may be proposed that the prison environment with its routines provided supportive atmosphere to adopt and maintain toothbrushing and denture care hygiene practices.

1.5 The main findings of the comparison of the 2011 and the 2019 Oral Health and Psychosocial Needs of the Scottish Prisoners and Young Offenders

A total of 342 participants in 2011 and 353 participants in 2019 consented to participate in the survey. Forty-four participants in 2011 and five participants in 2019 did not participate in the oral examination.

Demographic profile

Age, ethnicity and employment status: Participants in the 2019 survey had a significantly higher mean age of 32.10 years (95% CI: 20.68, 33.52) compared with participants in the 2011 survey with a mean age of 28.33 years (95% CI: 27.16, 29.50). Nearly 93% of the sample in both survey years stated that they were Caucasian. Employment status did not vary between the two survey years, with almost equivalent proportions of prisoners stating they were unemployed in the 2011 (67%) and 2019 (63%) surveys and in employment in the 2011 (26%) and 2019 (30%) surveys.

Marital Status and Living experience: Equivalent proportions of prisoners in both surveys stated that they were single and lived together as a family prior to imprisonment. Greater proportions of prisoners in the 2011 survey (58%) than the 2019 (42%) survey stated that they had resided in a children's institution. No difference was noted between the proportions of participants in foster care experience between the survey years. Fifty-two percent of prisoners in the 2011 and 48% of prisoners in the 2019 survey stated that they had experienced homelessness. The length of homelessness did not vary by survey year, however, greater proportions of prisoners in the 2011 survey stated that had been homeless for six months to one year and one to two years than in the 2019 survey and greater proportions of prisoners in the 2019 than in the 2011 survey stated that they had been homeless for more than two years.

Profile of prison experience

The total mean length of time of imprisonment for those who participated in the 2011 and 2019 surveys was 3.05 years. The range includes those in prison for the first time to those with 46 years of imprisonment in total. With regard to year of survey, participants in the 2011 survey had spent on average 2.37 (95% CI: 1.82, 2.91) years in prison compared with participants in the 2019 survey who had spent on average 2.90 (95% CI: 2.30, 3.48) years in prison. Mean total years of imprisonment varied by prison category. Male young offenders (0.75; 95% CI: 0.16, 1.33) had significantly lower mean numbers of years of imprisonment than female prisoners (2.09; 95% CI: 1.42, 2.77) who also had significantly lower mean years of imprisonment than adult male (4.18; 95% CI: 3.63, 4.80) prisoners.

The mean number of prison remands and sentences varied by survey year and prison category. Prisoners in the 2011 survey had greater mean number of remands (4.65; 95%CI: 3.79, 5.51) compared with prisoners in the 2019 survey (3.45; 95% CI: 2.94, 3.95). Adult male prisoners (5.49; 95% CI: 4.73, 6.24) had a significantly higher mean number of prison remands compared with female prisoners (2.55; 95% CI: 1.66, 3.48) and male young offenders. (3.45; 95% CI: 2.74, 4.16). Prisoners in the 2011 survey had greater mean number of sentences (3.16; 95% CI: 2.47, 3.86) compared with prisoners in the 2019 survey (2.74; 95% CI: 2.28, 3.20). Adult male prisoners (4.21; 95% CI: 3.59, 4.83) had significantly higher mean number of sentences compared with female prisoners (1.97; 95% CI: 1.15, 2.78) and male young offenders (2.07; 95% CI: 1.40, 2.75).

Health and Health Behaviours

Health status: Almost all of the prisoners (99%) in both survey years answered the medical history questions. Equivalent proportions of prisoners in both survey years reported that they suffered from at least one of the medical conditions itemised in the medical history form. Greater proportions of prisoners in the 2019 survey (55%) compared with the 2011 survey (45%) reported that they attended primary and/or secondary level healthcare services.

Prescribed medications: Reporting of prescription medication varied by survey year and prison category with greater proportions of prisoners in the 2019 survey (56%) compared with prisoners in the 2011 survey (44%) stating they had been prescribed medication. Similarly, greater proportions of adult male prisoners in the 2019 survey (63%) compared with the 2011 survey (37%) reported being on prescribed medication. The largest proportion of reported and named medications in both 2011 and 2019 were within the psychotropic medicine group, accounting for 61 percent of all reported prescribed medications. These included prescriptions for depression (33%), anxiety-related disorders (18%) and psychosis (9%). There were significantly lower reported and named medications for depression in 2011 (46%) than in 2019 (58%) ($X^2_{[1]}$=4.10; p=0.04) and similarly for anxiolytics; 22% in 2011 and 27% in 2019.

Health Behaviours: Larger proportions of prisoners in the 2011 survey (63%) compared with 2019 survey (37%) stated that they smoked cigarettes or vaped. The 2019 data were collected after the smoking ban in Scottish prisons was introduced in November 2018 and so although there was a significant difference in the survey years for smoking/vaping status it should be noted that of those who reported smoking in the 2019 survey, it was assumed they reported their smoking behaviours outside of the prison.

Smoking/vaping behaviour varied by prison category and survey year. Across the three prison categories greater proportions of females, adult males and male young offenders in the 2011 survey smoked/vaped compared with their counter categories in the 2019 survey. The reported mean number of cigarettes smoked daily did not vary by survey year with the mean number of cigarettes reportedly smoked daily in the 2011 survey being 17.41 (median: 15; range: 2 to 50) (95% CI: 16.32, 18.50) and in 2019, 18.21 (median: 20; range: 1 to 55) (95% CI: 16.38, 20.04). Surprisingly, male young offenders in 2019 survey reportedly smoked greater mean numbers of cigarettes daily (20.38) than male young offenders in the 2011 survey (16.79).

Greater proportions of prisoners in the 2011 survey (51%) compared with prisoners in the 2019 survey (49%) reported a history of drug use. Differences in prison category across survey years with regards to drug use was noted, with greater proportions of female and male prisoners in the 2019 survey than in the 2011 survey stating they had used drugs. Lower proportions of male young offenders who had participated in the 2019 survey (44%) than in the 2011 survey (56%) reported drug use. The number of prisoners stating a history of injecting drugs was lower in both survey years compared with those reporting drug use. Fifty-eight prisoners in the 2011 survey (45%) and 71 prisoners in the 2019 survey (55%) stated that they had used intravenous drugs. Similarly, only a small number of prisoners in both survey years stated that they had taken part in a drug rehabilitation programme. Sixty-three prisoners in the 2011 survey (54%) and 53 prisoners in the 2019 survey (46%) stated that they had taken part in a drug rehabilitation programme.

Psychosocial health

Dental Anxiety: Prisoners in the 2011 and 2019 surveys reported equivalent levels of dental anxiety. Female prisoners had significantly greater mean MDAS scores than male prisoners and male young offenders in both survey years. Forty-two participants in the 2011 and 45 in the 2019 survey scored 19 or over and were characterised as dentally phobic. Larger proportions of the participants in both survey years were extremely anxious about having a local anaesthetic injection and having their teeth drilled.

Oral health related quality of life: The mean OHIP-14 total scores for participants in the 2011 survey were 14.94 (95% CI: 15.33, 18.56) and 14.42 for participants in the 2019 survey (95% CI: 13.10, 15.73). The grouping variables survey year, prison category and the interaction of survey year with prison category significantly explained differences in the total mean OHIP-14 scores. Lower proportions of prisoners in the 2019 survey compared with prisoners in the 2011 survey reported experiencing occasional, fairly often and very often the following oral health impacts; painful aching mouth, having to interrupt meals, difficulty in doing usual jobs, life less satisfying and unable to function. Twenty percent of participants in 2019 compared with 28 percent in 2011 felt embarrassed very often on account of their teeth, mouth or dentures and a significant fall in the proportions of prisoners who felt irritable with others was noted between 2011 (11%) and 2019 (4%). Male prisoners in the 2011 than in the 2019 survey had significantly higher mean scores for the following oral health impacts: interruption of meals, being irritable with other people, difficulty in doing usual jobs and unable to function. Male young offenders in the 2011 survey had significantly higher mean OHIP-14 scores than male young offenders in the 2019 survey for twelve OHIP-14 items. OHIP-14 scores for individual items did not vary between women participants in both survey years.

Depression: The total mean CES-D scores for prisoners in the 2011 survey were 17.69 (95% CI: 16.28, 19.10) and 16.51 in the 2019 survey (95% CI: 15.17, 17.85). The grouping variable prison category and the interaction of survey year with prison category significantly explained differences in mean CES-D scores. Females had significantly greater mean CES-D scores than male prisoners and male young offenders in 2019 than in 2011 while male young offenders a significantly lower mean CES-D scores in 2019 than in 2011. Interestingly, greater proportions of prisoners in the 2019 survey (54%) compared with prisoners in the 2011 survey (46%) scored 16 or above on the CES-D scale, suggesting that they were suffering from a depressive illness. Greater numbers of female and male prisoners in the 2019 survey scored above the cut-off for depression compared with female and male prisoners in the 2011 survey respectively. A fall in the number of male young offenders scoring 16 and above on the CES-D was noted in the 2019 compared with the 2011 survey.

Oral Health and Oral Health Behaviours

Dental attendance and dental treatment experience: The reported pattern of dental attendance changed between the 2011 and 2019 surveys with significant differences noted in the reported interval between dental visits inside or outside prison by survey year. Greater proportions of prisoners, therefore, in the 2019 (74%) than in the 2011 survey (45%) stated that they had attended the dentist inside or outside prison within the previous year with lower proportions in 2019 than 2011 stating that they attended the dentist between one to five years or more. Reasons for dental visits also varied between survey years. Greater proportions of prisoners in the 2019 (35%) than in the 2011 survey (22%) stated that they visited the dentist for a routine dental examination and lower proportions of prisoners in the 2019 survey (48%) than in the 2011 survey (59%) reported that they attended when experiencing 'trouble with their teeth or gums'.

With regards to accessing prison dental services, greater proportions of prisoners in the 2019 survey (63%) than in the 2011 survey (37%) reported that they had had accessed dental services while in prison. Greater proportions of all participants in 2019 than participants in 2011 stated that they had accessed prison dental services. Barriers to accessing prison dental services were also noted. However, the proportion of prisoners reporting perceived barriers such as difficulty in accessing the service (appointment), infrequent nature of the dentists' treatment schedule, disliking the prison dental service, difficulty in getting a request form and difficulty in completing a request form was lower in 2019 compared to 2011.

The most commonly reported past dental treatments mentioned in both 2011 and 2019 were local anaesthetic injections (92%), fillings (90%), extractions (73%), radiographs (80%) and scale and polish (66%). By 2019 larger proportions of participants reported having received radiographs, extractions and scale and polishes compared with prisoners in the 2011 survey. Of interest was in increase in the proportion of prisoners reporting experience of fissure sealants and fluoride treatments in 2019 survey compared to 2011.

Dental decay experience: Two hundred and ninety-eight prisoners in the 2011 survey and 343 prisoners in the 2019 survey had an oral examination. The mean dental decay experience ($D_{3CV}MFT$) of prisoners in 2019 was significantly higher (13.70) than prisoners in 2011 (12.17). The mean $D_{3CV}MFT$ varied between female prisoners in the two survey years wherein female prisoners in 2019 compared with females in 2011 had significantly higher mean $D_{3CV}MFT$. Prisoners in the 2019 survey had significantly higher mean numbers of decayed teeth into dentine ($D_{3CV}T$) compared with prisoners in the 2011 survey. Female and male prisoners and male young offenders in the 2019 survey had significantly higher mean numbers of $D_{3CV}T$ compared with those who participated in the 2011 survey. Mean numbers of missing teeth due to dental decay (MT) and filled teeth (FT) did not vary by survey years and prison category even though increases in the mean numbers of MT were noted for female participants and small decreases in the mean number of MT for male prisoners and male young offenders between the 2011 and 2019 surveys and increase in the mean numbers of filled teeth noted in male prisoners and male young offenders in the 2019 compared with the 2011 survey. The overall care index in both the 2011 and the 2019 surveys was 30%. An increase was noted in the care index of male prisoners in the 2019 survey to 40% from 38% in the 2011 survey and for male young offenders from 18% in 2011 to 20% in 2019. A reduction in the care index for women, however, was observed with a fall from 34% in 2011 to 28% in 2019.

When the analysis of dental decay experience ($D_{3cv}MFT$) and decayed teeth into dentine ($D_{3cv}T$) was inspected across survey year and prison category it was found that the number of years of imprisonment as a co-variant had an effect on dental decay experience ($D_{3cv}MFT$) but not on the decayed teeth ($D_{3cv}T$). Therefore, the greater the number of years of imprisonment the greater the $D_{3cv}MFT$ but not $D_{3cv}T$. Adding the number of remands as a co-variant explained greater mean $D_{3cv}MFT$ and number of teeth decayed into dentine, however, the number of prison sentences explained greater dental decay experience ($D_{3cv}MFT$) only.

The prevalence of dental decay experience ($D_{3CV}MFT>0$) was 96% in the 2011 and 97% in the 2019 surveys. Significantly larger proportions of participants in the 2019 (68%) than those in the 2011 survey (48%) had greater unmet treatment need. Fifteen percent of the participants in the 2019 survey had enamel lesions requiring preventive treatment compared with 14% in the 2011 survey.

Prisoners in both survey years had a mean of 23 teeth present. Prisoners in the 2011 survey had significantly higher mean numbers of sound teeth (a mean difference of four teeth between survey

years) than those in the 2019 survey. Prisoners in the 2019 survey had significantly higher mean numbers of teeth which had been fissure sealed than those in the 2011 survey. Male young offenders had a mean increase of 0.5 of a tooth fissure sealed in the 2019 compared with the participants in the 2011 survey.

Periodontal health: plaque scores: Prisoners in the 2019 survey had significantly lower mean total, upper and lower plaque scores than those in the 2011 survey. Female prisoners and male young offenders in the 2019 survey had a significantly lower mean total, upper and lower plaque score than those in the 2011 survey. Male prisoners, however, in the 2019 survey had significantly higher mean total, upper and lower plaque score than those in the 2011 survey. Prisoners who stated that they brushed their teeth while in prison had lower mean plaque scores in both survey years compared with prisoners who stated they did not brush their teeth while in prison. Interestingly, the prisoners who stated that they brushed their teeth while in prison, in the 2019 survey, had significantly lower mean total, upper and lower plaque scores compared with prisoners in the 2011 survey. When the analysis of total plaque scores was inspected across survey year and prison category it was found that the effect of placing the number of years in prison, number of remands and number of sentences as a co-variant did not assist in explaining the mean total, upper and lower plaque scores.

1.6 Conclusions

The comparison of the 2011 with the 2019 survey of the oral health and psychosocial needs of people in prison in Scottish prisons showed:

[1] Few differences if any were found by survey year regarding education attainment, employment status, childhood residential care or experience of homelessness, suggesting that people in prison represented a group of people who may be considered to have the characteristics of people described as experiencing social exclusion. The need remains for people in prison on release to have the opportunity 'to maximise their capabilities and have control over their lives' (Marmot *et al.*, 2010). It may be suggested that peer interventions enable people to communicate with others and attain experiential learning resulting in educational and/or vocational qualifications. Peer interventions for health and oral health will not only promote health in its widest sense but also assist in allowing people in custody to become more socially included in society and to have 'fair employment and good work' (Marmot *et al.*, 2010).

[2] The change in dental service provider from the Scottish Prison Service to the NHS, Public Dental Service in late 2011 appears to have improved access to dental care in prison, reduced perceived barriers to accessing dental care in prison and enhanced treatment preferences in 2019. Improved oral health-related quality of life supports this conclusion that the treatment afforded to people in Scottish prisons in 2019 compared to 2011, was associated with a reduction of oral health impacts associated with toothache and pain and oral health functioning.

[3] There was little change in dental caries experience, with the mean number of teeth extracted or restored by survey year remaining similar. The incidence of decayed teeth increased by survey year and was affected by prison category with a large unmet treatment need noted in 2019. Despite the change in service provider no improvement in dental caries experience was noted.

[4] Periodontal health as indicated by plaque scores and oral cleanliness showed significant improvements by survey year and prison category. Of interest to note was the relationship between reported and increased toothbrushing behaviours when in prison with reduced plaque scores in 2019 compared to 2011.

[5] The introduction and implementation of the oral health improvement intervention in 2014, Mouth Matters, with its emphasis on the promotion of toothbrushing, denture hygiene and accessing and attending for dental care, would seem to be associated with improved oral health-related attitudes and oral hygiene behaviours as reflected in the lower plaque scores by survey year found in the 2019 than in the 2011 survey. Few if any changes, however, were noted in the avoidance of sugar-containing foods and drinks in prison and, for people in high security prisons and on longer term sentences. This is an important finding since there is a need to develop interventions which are peer implemented by and for people in custody, to promote health learning capacity, cognitive and psychosocial skills set to improve not only oral health and health but also life skills.

1.7 Recommendations

General Recommendations

- Gender specific recommendations should be tailored to the needs of the female prisoners, male prisoners and male young offenders.
- Prisoners should be provided basic life skills for maintenance of health, oral health and mental health and well-being.
- Prisoners should be trained as peer oral health mentors and complete SQA educational awards.
- Access to healthcare and health promotion should be part of pre-release preparations.
- Dental health care and oral health promotion protocols should be nested in Public Health Scotland policy documents.

Dental health care recommendations

- Dental health services and oral health promotion should be part of a multidisciplinary and multi-sectorial approach within and across the prison estate.
- There should be an equitable distribution of dental treatment provision protocols within the prison estate as provided by the NHS Boards.
- Prisoners should be provided with the skills to access dental health services within and out with the prison estate.
- There should be an equitable distribution of oral health-health promotion initiatives across the prison estate.
- There should be the provision of dental through-care and oral health promotion from within the prison to the outside world.
- Access to oral health promotion services should be an integral part of pre-release preparation.
- Access to dental health services should be an integral part of pre-release preparations.

Training and continuing professional development recommendations

- Training of dental health professionals should include effective communication with prisoners inside and with people during and after liberation.
- Training of all those working within the prison sector should provide tailored oral health promotion interventional to prisoners.
- Training of all those working within the criminal justice sector should provide tailored oral health promotion interventions to people during and after liberation.

2

The Scottish Oral Health Improvement Prison Programme Report

2.1 Background

In March 2005, the Scottish Executive Health Department's 'An Action Plan for Improving Oral Health and Modernising NHS Dental Services in Scotland' (Scottish Executive, 2005) was published in response to the two consultations documents, 'Towards Better Oral Health in Children' (Scottish Executive, 2002) and 'Modernising NHS Dental Services in Scotland' (Scottish Executive, 2003). The two main areas of the Dental Action Plan were to focus on the improvement of oral health of the Scottish population and to identify specific priority groups needing additional support to improve their oral health. Prisoners were identified as a group of individuals requiring enhanced support to achieve and maintain their oral health.

By 2007, the Prison Healthcare Advisory Board recommended the responsibility for the healthcare of prisoners including oral health should be transferred from the Scottish Prison Service to NHS Scotland and specifically to the NHS Boards in which the prisons were located (Prison Healthcare Advisory Board, 2007). In August 2010 a legislative amendment to enable the transfer of responsibility was passed by the Scottish Government, and by October 2011 the memorandum of understanding ensured that the responsibility of healthcare in prisons became the responsibility of the NHS Boards (NHS Scotland, 2011). The common purpose of this policy was to, 'improve prisoners' access to the appropriate range and quality of health services based on their needs'; the intention being to ensure equity in healthcare delivery and access. In order to achieve this aim, partnership working was highlighted as of central importance, with continuous professional education for all those working within the prison sector.

The health of prisoners has been described as 'poor', reflecting marked health inequities associated with the so-called cliff-edge of inequalities (Aldridge *et al.*, 2018). The first Health Promotion Strategy to promote health among prisoners in Scotland, 'The Health Promoting Prison' was published in 2002 (Scottish Prison Service, 2002). Later in 2008, the Scottish Government's 'Equally Well' (Scottish Government, 2008) report of the Ministerial Taskforce on Health Inequalities highlighted the need to put in place a programme to improve the oral health of prisoners. Therefore, by 2012, the publication of 'Better Health Better Lives for Prisoners' (ScotPHN, 2012), a framework to support a new partnership between the SPS and NHS Boards was published. This framework promoted the adoption of a 'whole prison approach' focussing on three key elements for [1] developing health promotional policies, [2] promoting a healthy prison environment and [3] the promotion of prevention, health education and other health promotion initiatives to address the health needs of people in prison. The health promotion structure was constructed around 11 'pillars' one of which was oral health. Oral health was placed centrally and perceived as an integral part of 'Better Health, Better Lives for Prisoners', within a common risk factor approach (Sheiham and Watt, 2000; ScotPHN, 2012) . The importance of oral health promotion within health promotion for physical and psychosocial health was emphasised, together with the intention for prisoners to be trained as 'health trainers . . . in oral health promotion' (ScotPHN, 2012).

Earlier in 2011, a survey of the Oral Health and Psychosocial Needs of the Scottish Prisoners and Young Offenders was conducted by the Scottish Oral Health Improvement Prison Programme in conjunction with NHS Boards (Freeman *et al.*, 2013). The results of the 2011 SOHIPP report led to the development

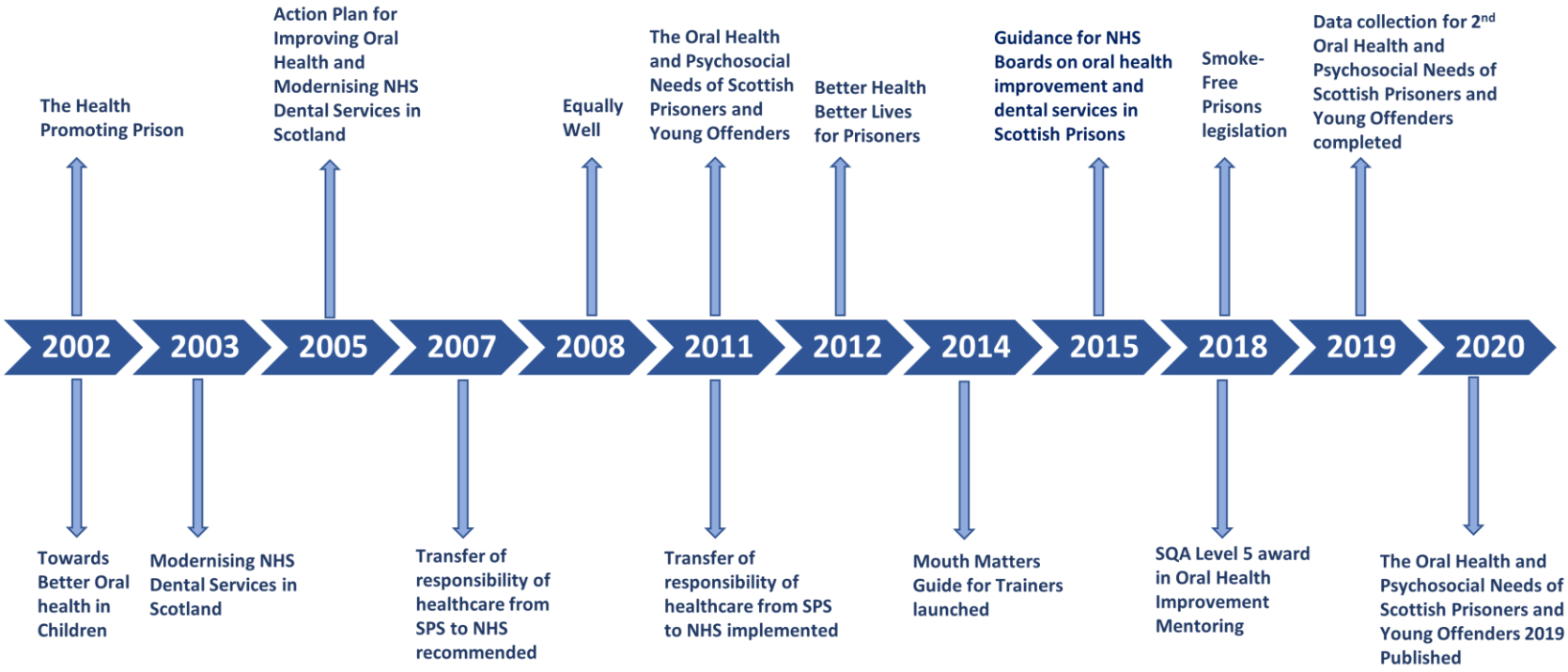
of the 'Mouth Matters' oral health promotion intervention for people in custody (Freeman *et al.*, 2014). This National Oral Health Initiative, proposed by the Scottish Government, aimed to promote the oral health of people in prison in Scotland, instigated by the NHS Boards' oral health improvement teams. The Mouth Matters Guide for Trainers was specifically designed to support the health professionals, prison staff and support workers to meet the detailed oral health needs of Scotland's prison population.

In 2017, the SPS announced its intention for all prisons in Scotland to be smoke-free by the end of 2018 (Scottish Prison Service, 2017), and to support this policy NHS Health Scotland published a smoke-free prisons pathway and highlighted 'peer support' as a key step in the pathway (NHS Health Scotland, 2018). At this time and following a qualitative exploration of the participants' oral health concerns (Freeman *et al.*, 2013) the Mouth Matters Intervention adopted the concept of the 'peer support model' to develop a peer oral health mentoring intervention in Scottish Prisons. Echoing 'Better Health, Better Lives for Prisoners' (ScotPHN, 2012), SOHIPP in collaboration with NHS Forth Valley and HMYOI Polmont developed the Mouth Matters Peer Oral Health Mentoring Programme. With Anne Crowe, NHS Education Scotland, an SQA level five award in Oral Health Improvement Mentoring (Scottish Qualification Authority, 2018) was achieved in 2018, for those undertaking the peer oral health mentoring training. Therefore, Mouth Matters was considered as an important peer support intervention to assist the smoke-free prisons agenda and was included as a key initiative for Smoke-Free Prisons by NHS Health Scotland (NHS Health Scotland, 2018).

The 2011 Oral Health and Psychosocial Needs of the Scottish Prisoners and Young Offenders, thus, serves as a benchmark for the assessments of quality, appropriateness and accessibility of dental health care within Scottish prisons following Scottish Government and SPS policy changes between 2011 and 2020. The 2019 Oral Health and Psychosocial Needs of the Scottish Prisoners and Young Offenders is both timely and appropriate to: 1) assess the health and oral health of people in custody, 2) identify the effect of healthy public policies on their oral health and psychosocial health status and 3) serve as a benchmark for future assessments of the quality, appropriateness and accessibility of dental health care within the Scottish prisons.

Figure 2.1 shows the timeline for policy change together with Scottish Oral Health Improvement Prison Programme 2011 and 2019 surveys and the development and implementation of Mouth Matters.

Figure 2.1: Timeline of policy change



2.2 Physical and mental health risks of prisoners

In Scotland, there are currently over 8,000 people in custody, of whom 80% come from the five most deprived communities across Scotland. Therefore the majority of Scottish prisoners reside in areas of high social deprivation with an increased experience of economic poverty, adverse childhood experiences and impoverished environments (De Viggiani, 2007). The prevalence and severity of physical illness and mental health problems are higher among people in prison than the general population (Tweed *et al.*, 2019). According to the SPS's Prisoner Survey 2017 (Carnie *et al.*, 2017), 31% prisoners were classified as alcohol dependent, whereas alcohol dependence in the general population was 1% (McLean *et al.*, 2018). Results from the SPS Addiction Prevalence Testing (ATP) statistics showed that in 2015/16 of the 960 tests carried out at prison entry 73% tested positive for drugs (including illicit use of prescribed drugs) (ScotPHO, 2019) compared with the 1.62% (95% CI: 1.58%-1.67%) for the Scottish general population (Information Services Division, 2019a). Prisoners have a higher prevalence of blood-borne virus infections and a tendency for unhealthy behaviours such as smoking and unsafe sex (ScotPHN, 2012). Sixty eight percent of prisoners identified themselves as smokers in SPS's Prisoner Survey 2017 (Carnie *et al.*, 2017) as opposed to 18% of the general population (McLean *et al.*, 2018).

2.3 Oral health in prison population

The oral and general health of prisoners is poorer than the non-prison population (Jones *et al.*, 2004; Heidari *et al.*, 2008; Walsh *et al.*, 2008). As mentioned above, people in prison come from socially excluded backgrounds, and high oral health needs have been noted at induction (Jones *et al.*, 2005). This has been attributed to social deprivation and exclusion together with lifestyle issues such as smoking, substance use (Arora *et al.*, 2020) and frequent consumption of food and drinks containing free sugars (Jones *et al.*, 2004; Heidari *et al.*, 2007).

The Scottish Prisons' Dental Health Survey of 2002 (Jones *et al.*, 2004) and The Oral Health and Psychosocial Needs of Prisoners and Young Offenders Survey of 2011 (Freeman *et al.*, 2013) characterised the oral health of prisoners as a pattern of increased decayed and missing teeth but fewer filled or restored teeth - highlighting a considerable unmet dental treatment need. Findings from the Scottish Prisoner Surveys indicated that 33% prisoners in 2008 and 41% prisoners in 2017 reported attending a dentist when in custody. However, 68% of prisoners in the 2008 SPS Prisoner Survey and 56% in the 2017 survey reported that it took them over 10 days to see a dentist (Carnie *et al.*, 2017). Since, historically, prison dental services focussed on dental treatment rather than offering preventive dental services, prison dental services appeared be unable to meet the dental demands of its population (Walsh *et al.*, 2008). This situation was further exacerbated by the rising number of people in prison and the ageing prison population.

Therefore with the transfer of responsibility of oral healthcare from SPS to NHS in 2011 and the implementation of the Mouth Matters Guide for Trainers in 2014 (Freeman *et al.*, 2014) across the prison estate (The Scottish Government, 2015), it may be suggested that there should be an improvement in the oral health status of people in custody (Figure 2.1). The need to conduct an additional survey of oral health and psychosocial needs of prisoners and young offenders in 2019 was therefore timely and appropriate to answer this supposition.

2.4 The aim and objectives

The aim of this survey was to conduct an oral health and psychosocial needs assessment of people in custody in 10 prisons across Scotland and to compare the findings of the 2019 survey with the 2011 survey to provide evidence-based recommendations to inform oral health strategy to promote the oral health of those in prison.

The specific objectives were to:

1. Conduct an oral health survey of people in prison;
2. Examine their health and oral health behaviours;
3. Assess dental anxiety, oral health-related quality of life and depression;
4. Compare the findings of the 2019 with the 2011 survey results to examine the effect of:
   (i) Change of policy of the transfer of responsibility of healthcare from SPS to NHS in 2011 on dental decay experience;
   (ii) Introduction of the Mouth Matters intervention in 2014 on toothbrushing behaviours, plaque scores, dental visiting and dental health attitudes.
5. Identify the effect of public health policy on oral health status, (i) the transfer of responsibility of healthcare from SPS to NHS in 2011 and (ii) the introduction of the Mouth Matters intervention in 2014;
6. Make recommendations to inform oral health strategy to promote the oral health of those in prison.

2.4.1 Structure of the main report

The main report will be structured as follows:

1. **Methods**
2. **Results**

   Part I: the 2019 Oral Health and Psychosocial Needs of the Scottish Prisoners and Young Offenders will contain details of the 2019 survey

   Part II: the comparison of the 2011 and the 2019 Oral Health and Psychosocial Needs of the Scottish Prisoners and Young Offenders will compare 2011 and 2019 findings
3. **Recommendations**
4. **Appendices**

2.5 Method

2.5.1 Sample description

[i] Prisons sampled

A sample of prisoners from 10 prison establishments was gathered (Table 3.1). The 10 prisons included those for women from HMP & YOI Cornton Vale, HMYOI Polmont and HMP Edinburgh, men from HMP Dumfries, HMP Grampian, HMP Inverness, HMP Shotts, HMP Addiewell, HMP Edinburgh, HMP Castle Huntly and HMP Perth and young men from HMYOI Polmont (Figure 3.2).

[ii] Sample size

The sample size was estimated and derived from the Scottish average daily prison population reported for the year 2015-2016 as being 7,676 (Scottish Prison Service). A post-hoc power analysis confirmed that a sample size of 421 would give 95% power to test for two-sided statistical significance and detect a significant difference between groups at the 5% level.

2.5.2 Procedure

Training day: Standardisation of the examiners (Appendix 3)

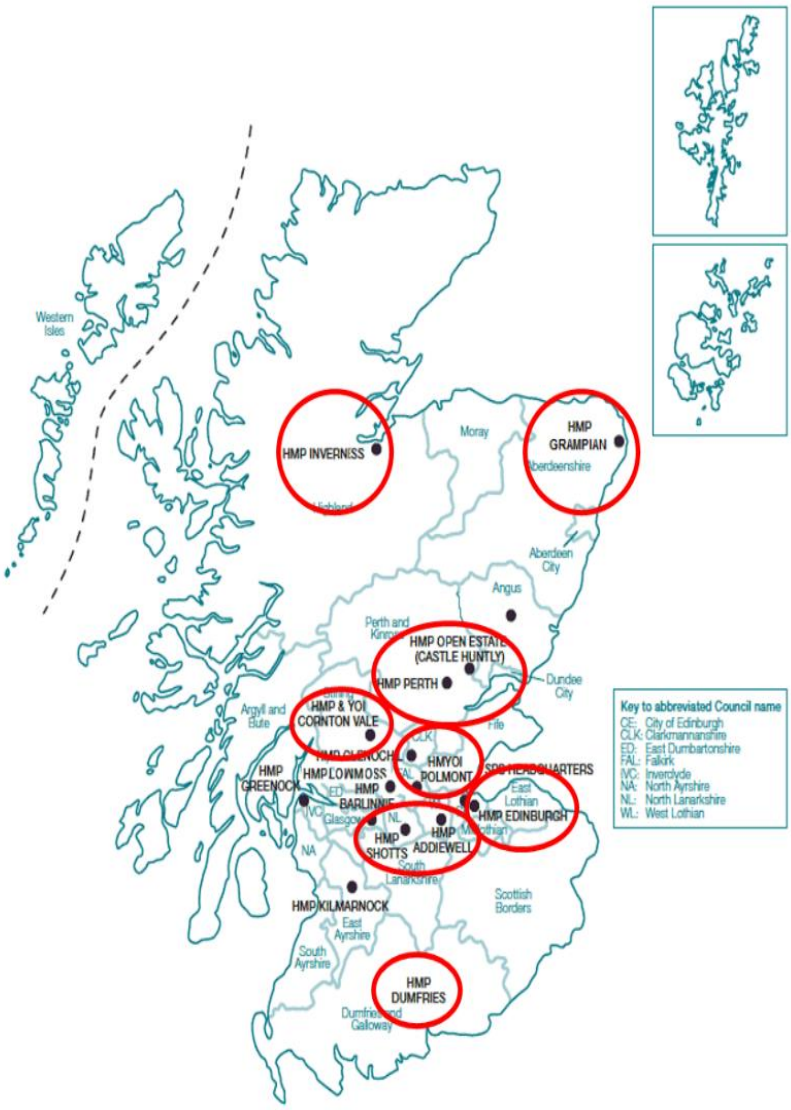
Prior to the start of the survey, the participating dentists, dental therapists (acting as dental examiners) and dental nurses (acting as dental scribes) participated in a two-day training to ensure standardisation of the clinical examination and administration of the questionnaire. The clinical content of the training to standardise dental caries assessment, used the ICDAS/ICCMS™ e-learning course and included the examination protocol and scoring criteria (ICCMS(TM), 2020). The attendees were required to complete e-learning modules prior to attendance. The training included:

1. Gaining consent and collecting data in the prison setting:
- Study protocol; participant information sheet; gaining written consent;
- Operational protocols within the prison environment;
- Logistical preparation for data collection;
- Site visits prior to oral health surveys;
- Continuous communication between all dental staff and the national survey team;
- Observations from those who had participated in the 2011 survey.

2. Conduct of the oral health needs assessment:
- Quantitative data collection;
- Oral health examination;
- Standardisation: ICDAS training;
- Administration of the questionnaire.

3. Personal Protective Training (PPT):
- To ensure that all dental examiners and dental scribes had fulfilled the SPS's Use of Force Policy (Scottish Prison Service, 2013) attended a 4-hour training session and a yearly 2-3 hour refresher course on PPT. All dental teams working in the prisons had completed their PPT requirement;
- To comply with the prison protocol study researcher (GA) attended the PPT training at HMP Perth.

Figure 2.2: Locations of participating prisons (Families Outside, 2015)



Operational strategy

As the survey involved multiple sites, an operational strategy was devised between the national survey team, the NHS Boards and SPS:

1. **The identification of a 'site collaborator':**

Each NHS Board through their site collaborator was responsible for overseeing the survey operation locally and liaising with the study researcher (GA) who coordinated the survey. The site collaborators were the point of contact between GA, the SPS and the NHS Board. They were responsible for overseeing the distribution of the participant information sheets, relevant local referral forms, ensuring the study equipment was in place prior to the data collection date and identifying the location for the dental examination.

2. **The local survey team:**

The local survey team included the site collaborator, the dental examiner, the dental scribe, the prison health centre manager, SPS representative and members of the national survey team.

3. **Communication strategy:**
Following the training and before the initiation of data collection a negotiation was initiated with all site collaborators by GA to agree on the next steps prior to data collection and to consult with the prison healthcare manager in each participating prison.
4. **Logistic plan for data collection:**
A pragmatic approach was adopted to manage the logistics prior to and on the survey day. This comprised of the number of days required for the data collection at each site. Based on estimates from the 2011 survey, a sample collection of 20 participants was targeted at each visit with additional days scheduled as necessary.
5. **Dental Survey Pack:**
All survey equipment comprising of examination instruments, toothbrushes, survey posters, questionnaires, reply slips, consent forms, participant information sheets, participant checklist and stationery were assembled and dispatched to each site. The dental examination packs comprised of disposable instrument packs (CPITN/Probe 8 Double Ended & Front Surface Mirror Plane 4) and disposable brushes impregnated with toothpaste were provided by the national team. Examination gloves, examination lights (headlamp), sharps disposal bins and cotton rolls were provided by the PDS at each site.
6. Delegation of duties:
The national team maintained a delegation log for each site with details of those involved with their designated roles.

Providing information and gaining participant informed consent
Posters advertising the survey along with reply slips were placed in common areas 1-2 weeks prior to the data collection. Prisoners were given the opportunity to discuss their participation with the NHS Boards' oral health promoters working in the prison. Interested prisoners were provided with participation information sheets 24-48 hours prior to the data collection. Prisoners who, in the opinion of the prison staff, posed a risk and did not understand English, were excluded from the survey. On the day of the data collection, the survey dental team at each site had a list of the participants who had volunteered to participate. A participant checklist was prepared which ensured a study code was assigned to each participant and smooth running of the data collection. Once the participants were brought to the data collection location, they were again informed of the study and written consent was obtained by the members of the survey team. A three-part no carbon consent form was used (top white for the master file, middle yellow for the site file and bottom pink for the participant).

The data collection period was between November 2018 to June 2019.

2.5.3 Questionnaire and administration

Questionnaire content (Appendix 2)

The questionnaire was in five main sections and consisted of:

1. Demographic profile:
The first part of the questionnaire pertained to the participants' demographic profile and asked questions on their age, gender, current and past living status, family status, reasons for homelessness, employment and previous occupation. Information of participants' job titles was reclassified in accordance with the major groups of the Standard Occupational Classification system (2010) (Office for National Statistics, 2010) which identifies occupations in relation to required 'qualifications, training, skills and experience'. Additional sub-categories were included to describe those who were in employment and education together and unable to work for reasons such as being retired.

2. Prison experience:
The participants were asked to state the how long they had been in prison, the length of their current sentence in years and the number of remands and sentences they had experienced. The number of remands, sentences and length of current sentence were dichotomised by their median splits. Therefore, those prisoners with up to two prison remands were classified as 'less experience of prison remands' (n=129; 56%) and those with three or more remands (n=100; 44%) were classified as 'greater experience of remands'. Similarly, those prisoners with at least one prison sentence (n=151; 54%) were classified as 'less experience of prison' and those with two or more sentences (n=127; 46%) were classified as 'greater experience of prison'.

3. Health and health behaviours:
Medical history: previous illness, chronic illnesses, prescribed medication and health behaviours such as tobacco and drug use were assessed using a medical history checklist.

4. Psychosocial health measures:
The Modified Dental Anxiety Scale (MDAS): MDAS scale, which consists of five questions, was used to assess dental anxiety. The participants were asked to rate their anxiety levels on a five-point scale ranging from not anxious (1) to extremely anxious (5) when asked about how they feel in relation to waiting for the dental treatment; drilling, scale and polish and local anaesthesia. The possible scores range from five to 25, with scores over 19 indicating dental phobia or extreme dental anxiety. The normative value is 11.6 with 12% of the UK population experiencing extreme dental anxiety or phobia (Gerry M Humphris *et al.*, 1995; Gerry M Humphris *et al.*, 2009; Gerry Humphris *et al.*, 2013).

The Oral Health Impact Profile–14 (OHIP–14) scale: The OHIP-14 is a 14-item questionnaire designed to assess oral health-related quality of life as measured by an individual's experience of oral health impacts. It is based on a hierarchy of impacts arising from oral disease, ranging in severity, and includes questions on functional limitation (e.g. pronouncing words), physical pain (e.g. painful aching mouth), psychological discomfort (e.g. feeling self-conscious), physical disability (e.g. interrupted meals), psychological disability (e.g. feeling embarrassed), social disability (e.g. irritability with others) and handicap (e.g. life less satisfying). The respondent is asked how frequently they had experienced each of the 14 oral health impacts, such as 'Have you had painful aching in your mouth?' in the previous 12 months. Responses are on a five-point Likert scale, with scores ranging from 0 (never) to 4 (very often). Individual item scores are presented together with an overall mean total impact score across all 14 items (Locker, 1988; Slade, 1997).

The Center for Epidemiological Studies Depression Scale (CES-D): CES-D is a valid and reliable scale used to measure depression. This self-reported scale consists of twenty items reflecting dimensions of depression such as depressed mood, feelings of hopelessness and interactions with other. The respondents are asked to rate their experience of each item in the previous week on a four-point Likert scale ranging from rarely or none of the time (scored 0) to mostly or all of the time (scored 3). Four of the twenty items are scored positively, and the responses are reverse scored i.e. the responses ranged from 3 (rarely or none of the time) to 0 (most or all of the time). Total scores range from 0 to 60, with scores of 16 or over indicating depressed mood (Radloff, 1977). In a survey of people residing in north London the prevalence of depression as assessed by the CES-D was 38.9% (Weich *et al.*, 2002).

5. Oral Health Attitudes and Behaviours:
A number of oral health attitudinal questions from the Adult Dental Health Survey (Kelly *et al.*, 2000), were included to measure the participants' attitudes to going to the dentist and were made on a four-point scale, ranging from 'definitely feel like that' (scored 4) to 'don't feel like that' (scored 1). The final part of the questionnaire asked about oral health behaviours and comprised of dental attendance

patterns, the timing of dental visits, reasons for attendance and previous dental treatments. Attendance at the prison dentist and their opinion of attending the prison dentist were also recorded. Participants were asked about their toothbrushing habits in the prison and at home, consumption of sugary foods and drinks between meals and cleaning and dentures hygiene.

Administration of the questionnaire

The questionnaire was completed prior to the oral examination. Many of those surveyed required help with completing the questionnaire due to poor eyesight, dyslexia and/or poor literacy skills. GA was available to assist by providing explanations but not to influence the participants' responses. A prison officer was present at all times for security reasons.

2.5.4 Oral health examination

The oral health examination formed the second part of the survey and consisted of four individual assessments. Data on more than 50% of the sample were collected in the prisons' dental surgeries within their health centres. The prison officers escorted the prisoners to and from the prison dental surgery. Due to large number of participants in the young offender group the survey was conducted in the medical room in the residential hall, using the examination lights (headlamp) contained within the survey pack provided.

1. Dental Decay Experience Assessment

Dental decay experience was assessed using the International Caries Detection and Assessment System (ICDAS). ICDAS is a two-digit visual scoring system used to assess decayed, restored and missing tooth surfaces (i.e. mesial, occlusal, distal, buccal and lingual) of each of the 32 teeth. The first digit records restorations (fillings) and sealants and the second digit records caries (decay) from 0 to 6, where 0 is sound and 1 to 6 demarcates caries severity, with 6 being the most severe (ICCMS(TM), 2020). ICDAS information was converted to Decayed, Missing and Filled scores based on the WHO 2013 DMFT criteria (Pitts, 2009). The decayed ($D_{3cv}T$) component was defined by ICDAS caries codes 4-6 (caries extending into dentine), missing category was limited to teeth lost due to caries and filled component excluded teeth with sealants. Where a tooth was both filled and decayed it was recoded as decayed. A filled tooth with initial caries lesions (ICDAS caries coded 1-3) was recoded as filled. For the purpose of this report the ICDAS codes for all dentate participants who agreed to be examined are presented are $D_{3CV}MFT$[2] (Table 2.1).

2. Periodontal Health Assessment: Simplified Oral Hygiene Index

Plaque scores were assessed on six teeth, if present. A score per index tooth was allocated according to the Simplified Oral Hygiene Index (OHI-S) scale of debris present (Figure 2.3). The plaque index score for an individual is obtained by adding the plaque scores per tooth and dividing by the number of teeth scored (Löe, 1967; Crippen *et al.*, 2003; Reddy, 2017).

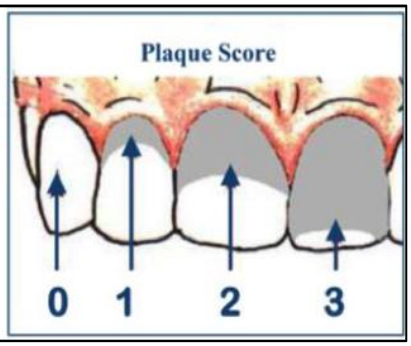
3. Oral Mucosa

Oral mucosa is the primary protective membrane that lines the cavity of the mouth, including the gums. Six areas of oral cavity were examined: the lips, buccal mucosa (cheeks), tongue, floor of the mouth, palate and fauces (throat). A score was allocated per intra-oral mucosal site recoding: lesion absent, lesion present (monitor) or lesion present (refer).

[2] Please note that the 2011 dental caries data were recoded from the original ICDAS 2011 data, using the 2019 algorithm, when the data were merged for the comparisons in Part 2 of this report.

Figure 2.3: The Simplified Oral Hygiene Index

0= No debris or stain present
1= Soft debris covering not more than 1/3 of the tooth surface, or presence of extrinsic stains without other debris regardless of surface area covered.
2= Soft debris covering more than 1/3, but not more than two thirds, of exposed tooth surface.
3= Soft debris covering more than two thirds of the exposed tooth surface.



4. Denture Assessment

The presence of complete (upper and lower) and partial (upper and lower) dentures was recoded. All dentures were examined for stability, retention and occlusion to provide an assessment of overall clinical satisfaction.

Table 2.1: Conversion of ICDAS caries codes to DMFT Decay (D) codes

ICDAS Codes		**DMFT Index**		
CARIES		**Decayed (D1)**	**Decayed (D2)**	**Decayed (D3)**
0 –	Sound			
1 –	First change in enamel	✓		
2 –	Distinct visual change in enamel	✓		
3 –	Enamel breakdown, no dentine visible	✓	✓	
4 –	Underlying dentinal shadow	✓	✓	✓
5 –	Distinct cavity	✓	✓	✓
6 –	Extensive distinct cavity	✓	✓	✓
MISSING			**Missing (M)**	
97 –	Tooth extracted as a result of caries	✓	✓	✓
98 –	Tooth missing for other reasons			
99 –	Unerupted			
P –	Implant			
RESTORATIONS			**Filling (F)**	
0 –	Not sealed or restored			
1 –	Sealant, partial			
2 –	Sealant, full			
3 –	Tooth colored restoration	✓	✓	✓
4 –	Amalgam restoration	✓	✓	✓
5 –	Stainless steel crown	✓	✓	✓
6 –	Porcelain, gold, PFM crown or veneer	✓	✓	✓
7 –	Lost of broken restoration	✓	✓	✓
8 –	Temporary restoration	✓	✓	✓

2.5.5 Statistical analysis

The data were coded and entered into a computer and analysed using statistical packages SPSS v25 (IBM) and Stata v16 (StataCorp LLC). Since the prisons sampled were predominately for adult men, women and male young offenders, the variable 'prison category' was replaced and used as an explanatory variable to explain differences in age and gender (Table 3.2). The data were subjected to frequency distributions, chi-squared tests, t-tests, Analysis of Variance (ANOVA) and two-way ANOVA. The post hoc Scheffe test was used to determine significant differences between groups. These differences are indicated by suffices in the tables of results. The significance level for all statistical tests was set at 5% i.e. $p<0.05$.

2.5.6 Ethical issues, confidentiality and data security

Ethical approval was obtained from the Scottish Prison Service Research Access and Ethics Committee and the East of Scotland Research Ethics Service (REC Ref: 17/ES/0083). Individual Research and Development Approvals were obtained from NHS Dumfries and Galloway, NHS Forth Valley, NHS Grampian, NHS Highland, NHS Lanarkshire, NHS Lothian, NHS Shotts and NHS Tayside. (Appendix 1)

All data were returned to the University of Dundee. All the participants were given a study ID and personal identifying information such as date of birth was converted to age in years on the date of the survey and removed from the dataset for analysis. Data were checked for any inaccuracies due to data entry. The consent forms and questionnaires were stored in a secure University location, while all the electronic data were stored on encrypted University computers.

3

Results:
Part 1: The 2019 Oral Health and Psychosocial Needs of Scottish Prisoners and Young Offenders

3.1 Demographic Profile

3.1.1 Sample

Tables 3.1 and 3.2 show the percentages of those who participated by prison category and by location of the participating prison. A total of 353 participants consented to participate in the survey (Table 3.1 and Table 3.2). Five participants did not participate in the oral examination. Of those five who did not participate in the oral examination, the reasons for non-participation included being at work/education (three) and dental anxiety (two). The 353 participants of the targeted 421 participated in the questionnaire giving a response rate of 84%. The response rate for the questionnaire and oral examination was 83%.

Table 3.1: Participants in the survey and oral examination and survey only by Prison Category

Prison Category	Survey and Examination	Survey only	Total
Female	87 (25%)	2(0.6%)	89 (25%)
Adult male	144 (40%)	3 (0.8%)	147 (42%)
Male young offender	117 (33%)	-	117 (33%)
Total	**348**	**5**	**353**

Table 3.2: Participants in the survey and oral examination and survey only by location of the participating prisons

Health Board	Prison site	Target Sample (n)	Sample collected (n)			Survey and Examination	Survey only
			F	M	MYO		
NHS Dumfries & Galloway	HMP Dumfries	15 (M)¥		15		15	-
NHS Forth Valley	HMP Cornton Vale	35 (F)	35			34	1
	HMP Polmont	35 (F); 120 (MYO)	35		117	151	1
NHS Grampian	HMP Grampian	18 (M)		5		5	-
NHS Highland	HMP Inverness	10 (M)		10		9	1
NHS Lanarkshire	HMP Shotts	30 (M)		14		13	1
NHS Lothian	HMP Addiewell	35(M)		20		20	-
	HMP Edinburgh	38 (M); 30 (F)	19	28		47	-
NHS Tayside	HMP Castle Huntly	15 (M)		15		15	-
	HMP Perth	40 (M)		40		39	1
Total		**421**		**353**		**348**	**5**

¥: F: adult and young offender females; M: adult males; and MYO: male young offender

3.1.2 Age

The mean age of the total sample was 32.10 years (95% CI: 30.68, 33.52) ranging from 16 to 83 years with a median age of 30.5 years. Forty percent (140) were aged 16-24 years, 22% (78) were aged 25-34 years and 19% (67) were aged 35-44 years. The remainder of the sample was 45 years or older (19%). The mean age of all female prisoners was 35.55 years (95% CI: 33.40, 37.71), of male prisoners, 40.27 (95% CI: 38.12, 42.41) and of young offenders, 19.33 years (95% CI: 19.11, 19.56). Mean age for all male prisoners was 30.95 years (95% CI: 29.22, 32.69) (Figure 3.1).

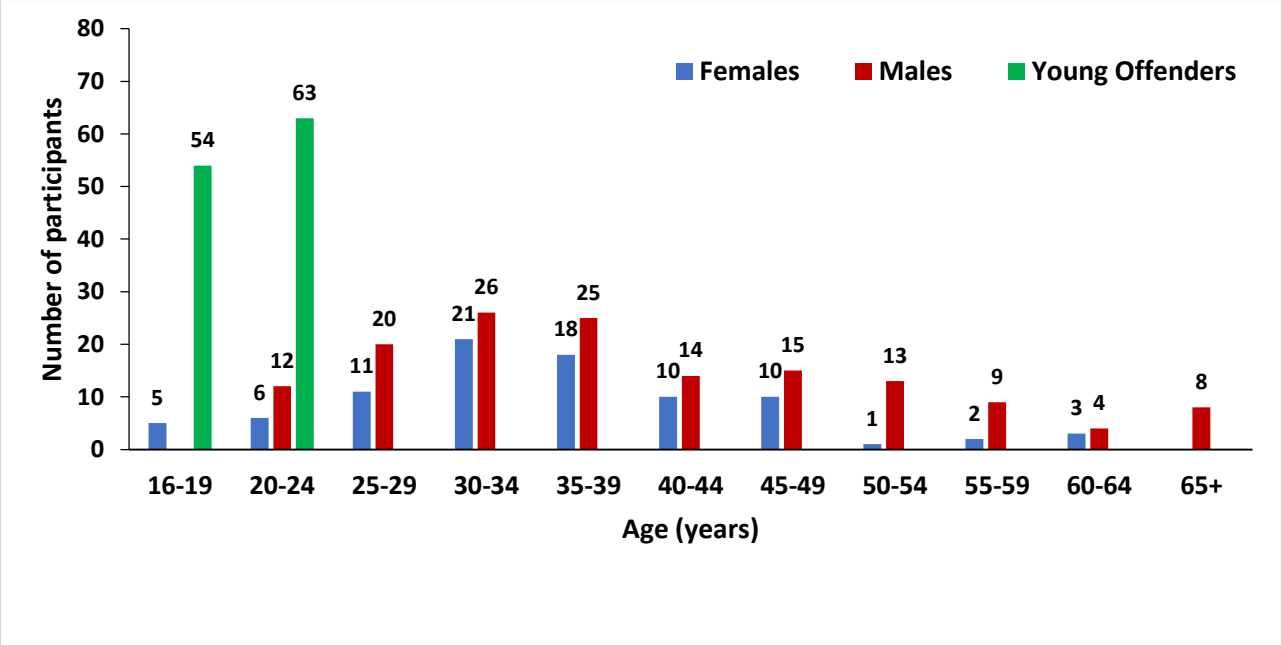
3.1.3 Marital and family status

Seventy six percent (258) of the sample stated that they were single, 16% (56) were living with a partner and 7% (25) were widowed. Significantly larger proportions of young offenders (90%) were single compared with male (64%) or female prisoners (79%) ($X^2_{[4]}$=75.08; p<0.001).

One hundred and sixty-one participants (47%) reported that they had children. Of those reporting they had children, 57 participants had one child, 41 had two children, 32 had three children and the remaining 27 had four or more children. Significantly greater proportions of adult male prisoners reported having at least one child than female prisoners or male young offenders ($X^2_{[2]}$=87.58; p<0.001).

Seventy prisoners who had children were living as a family prior to imprisonment. Forty-eight percent of men and 44% women lived as a family with their children prior to their current imprisonment ($X^2_{[1]}$=0.13; p=0.72).

Figure 3.1: Demographic profile of participants: age by prison category



3.1.4 Living arrangements

Three hundred and forty-two (97%) participants provided information on their current living arrangements prior to imprisonment. The largest proportion of participants reported living with their parents or family (32%), in rented accommodation (30%), or in their own property (24%). (Table 3.3).

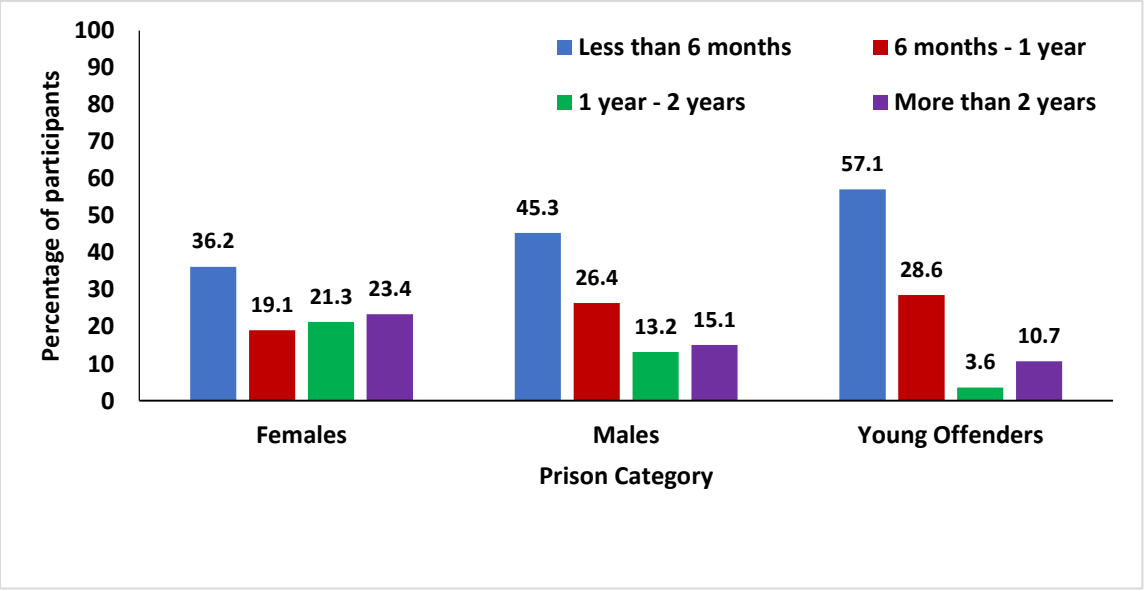
Table 3.3: Living arrangement prior to imprisonment

Living arrangement prior to imprisonment	Number (n)	Percentage (%)
With parents or family	110	32
Rented (tied) accommodation	104	30
Own property	81	24
Children's institution or home	2	1
Temporary accommodation (hostel or half- way house)	23	7
With friends (e.g., sofa surfer)	18	5
B&B	4	1

When asked about living arrangements as a child, 23% (79) of the participants reported that they had been in children's institution or care and 12% (43) reported that they had been foster care. Thirty-two participants had stated that they had experience of both children's institutions and foster care. Thirty three percent young offenders had lived in children's institution or care compared with 15% male prisoners and 24.7% female prisoners ($X^2_{[2]}$=11.62; p=0.003). Eighteen percent of young offenders reported having lived in foster care compared with 15% female prisoners and 7% male prisoners ($X^2_{[2]}$=7.73; p=0.02).

Thirty nine percent (135) of prisoners stated that they had experienced homelessness at some point in their lives with significantly greater proportions of adult male (40%) and female prisoners (39%) compared to young offender males (21%) stating they had experience of homelessness ($X^2_{[2]}$=26.91; p<0.001). No significant differences were observed in the length of homelessness reported by prison category ($X^2_{[6]}$=.40; p=0.21) (Figure 3.2).

Figure 3.2**:** Living arrangements: length of homelessness of prisoners



3.1.5 Occupation

Ninety-nine percent (384) of participants provided information on their occupational and/or educational status prior to their imprisonment. Over 60% of participants reported that they were unemployed prior to their current imprisonment with smaller proportions stating they were in employment, training or education. (Table 3.4).

Table 3.4: Occupation and education status prior to imprisonment

	Female n(%)	**Males** n(%)	**Young offenders** n(%)	**Total** n(%)
Unemployed	**73 (83)**	**72 (49)**	**75 (66)**	**220 (63)**
Employed	**12 (14)**	**69 (47)**	**24 (21)**	**105 (30)**
Managers, Directors and Senior officials		3		4
Professional occupations	2			2
Associate Professional and Technical	1	3		4
Administrative and Secretarial		1		1
Skilled Trades		20	4	24
Caring, Leisure and Other services	1			1
Sales and Customer Services		5	1	6
Process, Plant and Machine operatives		9	1	10
Elementary Occupations	3	11	6	20
Occupation not named / Unknown	5	17	12	34
Training (apprentice/trainee)			**4 (4)**	**4 (1)**
Associate Professional and Technical				
Administrative and Secretarial				
Skilled Trades			1	1
Caring, Leisure and Other services				
In formal education	**2 (2)**	**1 (1)**	**7 (6)**	**10 (3)**
In education and employment together	**1 (1)**		**3 (3)**	**4 (1)**
Unable to work (Retired)		**5 (3)**		**5 (1)**

3.1.6 Ethnicity

Ninety four percent (331) participants stated that they were Caucasian, while the remained stated that they were Black, Asian and Minority Ethnic groups (Black: 6, mixed race: 5, Asian: 3, Chinese: 2, Lithuanian: 1, Middle-Eastern: 1, Romanian: 1 and Vietnamese: 1). Three hundred and forty participants stated that their first language was English. Other first languages included: Cantonese (1), Farsi (1), Latvian (1), Lithuanian (2), Pashto (1), Polish (1), Portuguese (1), Romanian (1), Slovakian (3). The majority of those for whom English was their second language were adult male prisoners.

3.2 Prison experience

3.2.1 Length of time in prison

The mean length of time of reported prison sentence was 2.90 years (95% CI: 2.30, 3.48; SD: 5.33 years). Table 3.5 shows the relationship of age group and prison category with the reported length of time of spent in prison (years). Participants aged between 16-24 years had spent significantly lower mean number of years in prison compared with those who were 35 years of above. Male young offenders reported significantly fewer mean number of years in prison than adult male prisoners.

Table 3.5: Prison experience: Comparison of length of time in prison by age and prison category

	Time in prison (years) Mean (95% CI)	F(df)	p
Age group			
16-24 years (n= 121)	1.13 (0.87, 1.39)[1*]		
25-34 years (n= 70)	2.98 (2.04, 3.93)[1,2]	11.92 [3, 311]	<0.001
35-44 years (n= 61)	3.51 (2.01, 5.00)[2,3]		
45 + years (n= 61)	5.83 (3.57, 8.08)[3]		
Prison category			
Female (n= 76)	2.62 (1.59, 3.65)[1,2*]		
Males (n= 140)	4.26 (3.11, 5.42)[2]	10.27 [2, 315]	<0.001
Young offenders (n= 100)	1.22 (0.91, 1.53)[1]		

*The suffixes show the significant differences in mean between groups with non-identical numeric characters

3.2.2 Number of prison remands and sentences

The mean number of prison remands was 3.45 (95% CI: 2.94, 3.95) and the mean number of sentences was 2.74 (95% CI: 2.28, 3.20) as reported by the participants. The number of prison remands ranged from one to 25 with a median of two remands. The number of sentences ranged from one to 25 with a median of one sentence (Table 3.6).

Table 3.6: Number of remands and sentences by prison category

	Prison category	Never n(%)	1-5 n(%)	6-10 n(%)	11-15 n(%)	16-20 n(%)	21+ n(%)
Remands	All	15 (7)	169 (74)	37 (16)	5 (2)	2 (1)	1(0.4)
	Females	3 (6)	41 (84)	5 (10)			
	Males	6 (6)	61 (64)	22 (23)	4 (4)	1 (1)	1 (1)
	Young Offenders	6 (7)	67 (79)	10 (12)	1 (1)	1 (1)	
Sentences	All	12 (4)	236 (85)	24 (9)	3 (1)	2(1)	1(0)
	Females	6 (10)	54 (86)	2 (3)		1 (2)	
	Males	3 (2)	103 (79)	20 (15)	3 (2)		1 (1)
	Young Offenders	3 (4)	79 (93)	2 (2)		1 (1)	

Male participants had significantly higher mean number of remands compared with young offenders and female participants. With regards to the relationship of prison category with the number of prison sentences male participants had significantly higher mean number of prison sentences compared with female participants and young offenders (Table 3.7).

Table 3.7: Prison experience: comparison of the mean number of remands and sentence by relationship of prison category

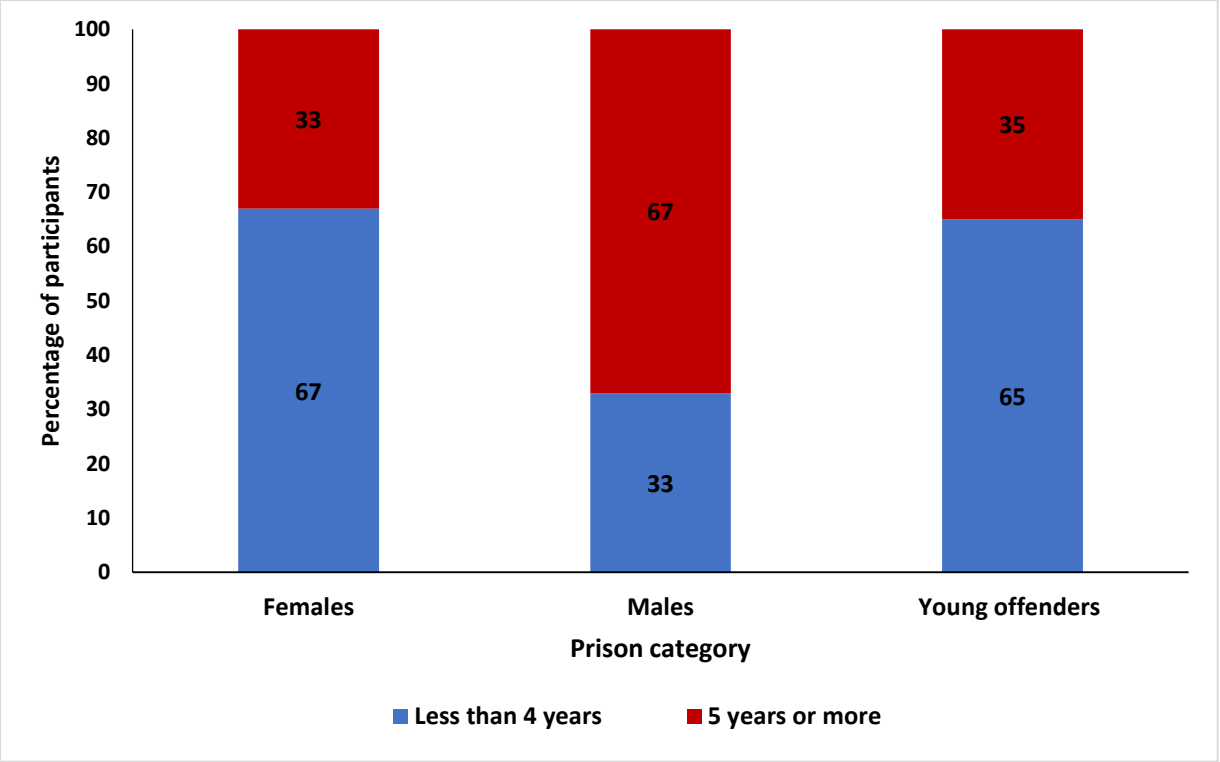
Prison category (n)	Mean number of remands (SD)	F(df)	p
Female (49)	2.53 (2.39)[1*]		
Male (95)	4.36 (4.39)[2]	6.46 [2, 226]	0.002
Young Offenders (85)	2.79 (2.77)[1]		
Prison category (n)	**Mean number of sentences (SD)**	**F(df)**	**p**
Female (63)	2.02 (2.61)[1*]		
Male (130)	3.27 (3.60)[2]	7.23 [2, 275]	0.001
Young offenders (85)	1.82 (2.13)[1]		

*The suffixes show the significant differences in mean between groups with non-identical numeric character

3.2.3 Length of current imprisonment

One hundred and sixty-four (52%) participants stated that their current imprisonment was for a short-term period (≤4 years); 48% (152) stated being on longer-term sentences (≥ 5 years) with adult male prisoners reporting having spent a greater length of time in prison (Figure 3.3).

Figure 3.3: Prison experience: Length of time in prison by prison category



3.3 Health and health behaviours

3.3.1 Physical health

Three hundred and fifty-one prisoners answered questions on their medical history. One hundred and fifty-three prisoners (44%) reported that they suffered from at least one of the illnesses mentioned on the medical history questionnaire. Fifteen percent reported they suffered from hypertension, 2% from myocardial infarction and 2% with angina. Respiratory illnesses including asthma were reported at 16%. Other illnesses noted by the participants included bleeding and/or bruising easily (17%), allergies to medicines or food (14%), epilepsy (3%), diabetes (3%) and infectious diseases such as HIV/Hepatitis C (2%).

Significantly greater proportions of women (22%) compared to all male participants stated that they had hypertension ($X^2_{[1]}$=4.80; p=0.03) and a significantly greater proportion of females (6%) than all male participants (1%) stated that they were HIV/Hepatitis C positive ($X^2_{[1]}$ = 8.43; p = 0.01). When the total sample was compared, statistically significant proportions of females compared to all male adult and young offenders stated that they suffered from COPD/asthma ($X^2_{[1]}$ = 6.76; p = 0.009) and bled and bruised easily ($X^2_{[1]}$ = 21.25, p <0.001) (Table 3.8).

3.3.2 Prescribed medication

Three hundred and twenty-seven participants provided information regarding attendance for medical appointments, 134 (41%) respondents stated that they attended primary and/or secondary level medical services. Significantly greater proportions of male (50%) than female (36%) prisoners and young offenders (14%) stated that they had accessed primary or secondary level medical care ($X^2_{[2]}$=34.25; p<0.001). One hundred and ninety-eight respondents (59%) stated that they had been prescribed medication by the prison health centre. One hundred and sixty-seven respondents (47%) provided details of their medication. Of those who provided details of their prescribed medication, 71% were psychotropic preparations: 40% anti-depressants, 20% anxiolytics and 11% antipsychotics. Other prescribed medication included analgesics (31%), cardiovascular medication (16%) and anti-epileptics (16%) (Table 3.9).

Table 3.8: Frequency of reported medical conditions

Physical Illness	**Total** n (%)	**Females** n (%)	**Males** n (%)	**Young offenders** n (%)
Bleed/Bruise easily	55 (17)	27 (33)	16 (11)	12 (17)
COPD/Asthma	54 (16)	21 (25)	23 (16)	10 (9)
Blood Pressure	51 (15)	19 (2)	28 (19)	4 (4)
Allergies	47 (14)	14 (17)	25 (18)	8 (7)
Epilepsy	11 (3)	5 (6)	5 (3)	1 (1)
Diabetes	11 (3)	4 (5)	6 (4)	1 (1)
Heart attack	8 (2)	2 (2)	6 (4)	
HIV/Hepatitis C	7 (2)	5 (6)	2 (1)	
Angina	5 (2)	0	4 (3)	1 (1)

Table 3.9: Prescribed medication

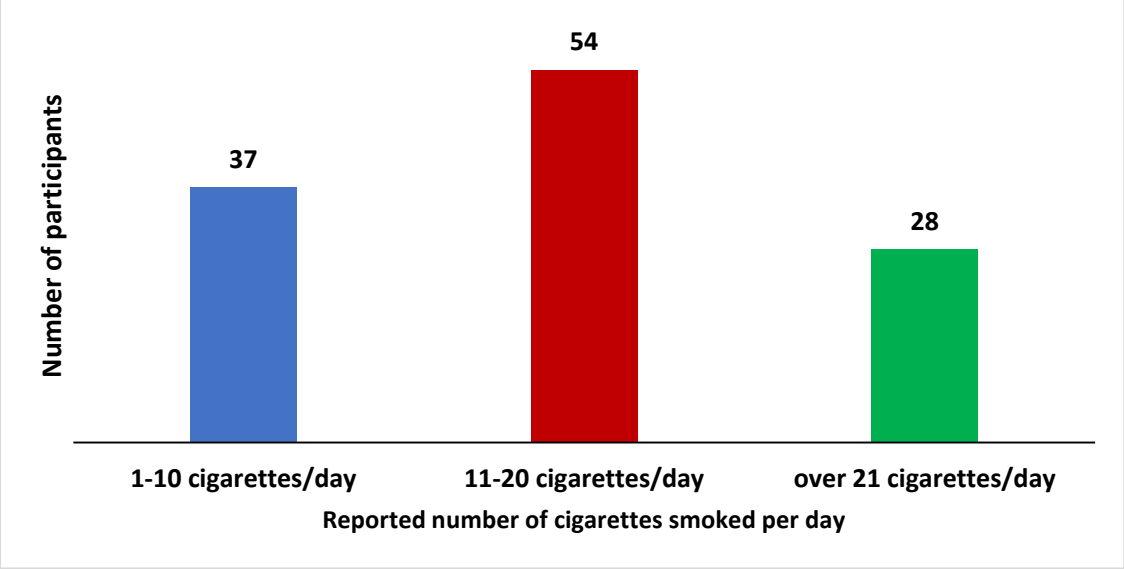
	Number of prisoners	Percentage of the total sample (n= 353)	Percentage with details of medication (n=167)
No medication mentioned	**137**	**41% ***	
Medication prescribed	**198**	**59% ***	
Medication details provided	**167**	**47%**	
Anti-depressants	66	19%	40%
Analgesics	52	15%	31%
Anxiolytics	34	10%	20%
Cardiovascular medication	29	8%	17%
Methadone	27	8%	16%
Anti-epileptics	27	8%	16%
Gastro-intestinal medication	22	6%	13%
COPD/Asthma medication	19	5%	11%
Anti-psychotics	19	5%	11%
Metabolic diseases	7	2%	4%
Skin cream	6	2%	4%
ADHD medication	6	2%	4%
Antibiotics	4	1%	2%
Lipid regulating drugs	4	1%	2%
Vitamin Supplements	4	1%	2%
Other medication	4	1%	2%
Anti-Viral Medications	3	1%	2%
Antihistamines	3	1%	2%

*valid percentage

3.3.3 Smoking Behaviours

Forty-four percent (152) of the sample reported that they either smoked tobacco (n= 136) or used electronic cigarettes (n= 16). The mean number of cigarettes smoked daily[3] (outside the prison) was 18.21 (95% CI: 16.38, 20.04) with a range from one to 55 per day and a median of 20/day. Equivalent proportions of male (44%) and female (44%) prisoners reported that they smoked or used electronic cigarettes ($X^2_{[1]}$=0.02; p=0.89). (Figure 3.4).

Figure 3.4: Smoking behaviours: frequency of daily cigarette smoking outside of prison



Employment status and experience of homelessness were significantly associated with smoking behaviours (outside the prison). Significantly larger proportions of participants who were unemployed prior to imprisonment, and had experienced homelessness stated they smoked cigarettes (and/or electronic cigarettes) than others (Table 3.10).

Table 3.10: Smoking behaviours outside of prison: comparison by demographic factors.

	Smoking behaviours n (%)	X^2	**p**
Employment			
Unemployed	106 (49)	6.84	0.03
Employed	40 (38)		
Education/training	4 (22)		
Marital Status			
Single	118 (46)	3.55	0.17
Married/cohabiting	22 (39)		
Separated/divorced/widowed	7 (28)		
Homelessness			
No	78 (38)	8.13	0.004
Yes	72 (53)		

[3]The 2019 data were collected after the smoking ban in Scottish prisons was introduced in November 2018. It should be noted that in those who reported smoking in the 2019 survey, it was assumed they reported their smoking behaviours outside of the prison. Smoking behaviours included smoking tobacco and using electronic cigarettes.

All male prisoners and young offenders on an average reported smoking 18.20 cigarettes/day (95% CI: 16.05, 20.34) and female prisoners 18.25 (95% CI: 14.57, 21.93). There was no statistically significant difference in the mean number of cigarettes smoked per day between male and female prisoners (t = 0.03; p = 0.98). When the number of cigarettes smoked daily were compared across different age groups there was no significant difference in the mean number of cigarettes or electronic cigarettes smoked/vaped each day ($F_{[3,115]}$=0.51; p=0.68).

Mean number of cigarettes smoked per day were also examined by demographic factors. The grouping variable employment status explained the mean number of cigarettes smoked daily by prisoners. Prisoners who were in education/training reported that they smoked a significantly higher mean number of cigarettes daily compared with those who reported being unemployed or in employment (Table 3.11).

Table 3.11: Smoking behaviours: comparison of the mean number of cigarettes smoked daily by demography

Demographic factors	**Cigarettes/ day Mean (95% CI)**	**F(df)**	**p**
Employment			
Unemployed	19.09 (17.13, 21.05)[1*]	6.05 (2, 114)	0.003
Employed	14.68 (11.57, 17.78)[1]		
Education/training	32.33 (-35.53, 100)[2]		
Marital Status			
Single	18.68 (16.58, 20.79)	1.17 (2, 112)	0.31
Married/cohabiting	17.18 (13.09, 21.26)		
Separated/divorced/widowed	13 (3.30, 22.70)		
		t	**p**
Homelessness			
No	17.26 (14.61, 19.91)	-1.06	0.29
Yes	19.22 (16.61, 21.83)		

*Suffixes show the significant differences in the mean between groups with non-identical numeric characters

Smoking behaviours: prison experience

Prisoners with more experience of remand (53%) reported smoking significantly less than prisoners with less remand experience (47%) ($X^2_{[1]}$=7.49; p=0.006). When smoking behaviours were compared to the length of current prison sentence, significantly smaller proportions of those serving longer (34%) than shorter (66%) prison term stated that they smoking or vaped ($X^2_{[1]}$=19.82; p<0.001).

Prisoners with greater experience of sentences reported smoking more cigarettes daily (19.13 [9.15]) compared to those with less experience of sentences (15.80 [9.11]) (t=-1.71; p=0.09. However, no statistically significant differences were noted in reported mean number of cigarettes smoked daily between those with less (18.30 [9.56]) and greater (18.63 [10.81]) experience of prison remands (t = -0.15; p=0.88). Prisoners with shorter prison sentence of less than four years stated they smoked a greater number of cigarettes/day (18.66 [9.21]) than those with longer prison sentences (12.72 [9.26]) (t=2.02; p=0.05).

3.3.4 Drug taking behaviours

History of drug use and injecting drug use

Seventy-four percent (255) of respondents stated that they had a history of drug use, with 21% (71) stating that they had also used intravenous drugs. Significantly larger proportions of male young offenders compared to female and male prisoners admitted to using drugs, whereas larger

proportions of female prisoners than adult male and male young offenders reported intravenous drug use (Table 3.12).

Table 3.12: Drug taking behaviour: comparisons by prison category

Prison category	Females n (%)	Males n (%)	Young offenders n (%)	X^2	p
Previous drug use	71 (81)	91 (63)	93 (82)	14.06	0.001
Injecting drug use	39 (45)	26 (18)	6 (5)	48.39	<0.001

Table 3.13 shows comparison of drug taking behaviour by demographic factors. Significantly larger proportions of prisoners who stated that they were single and homeless and were from an ethnic minority group than others reported drug use and larger proportions of those who were unemployed and homeless compared with others reported injecting drug use.

Table 3.13: Drug taking behaviour: comparisons by demographic factors of prisoners

Demographic factors	Previous drug use n (%)	X^2	p	Injecting drug use n (%)	X^2	p
Employment						
Unemployed	166 (77)			63 (29)		
Employed	73 (70)	2.03	0.36	7 (7)	23.83	< 0.001
Education/training	13 (72)			1 (6)		
Marital Status						
Single	202 (79)			59 (29)		
Married/cohabiting	40 (73)	26.93	<0.001	9 (17)	3.82	0.15
Separated/divorced/widowed	8 (32)			2 (8)		
Homelessness						
No	136 (66)	17.17	<0.001	18 (9)	46.66	< 0.001
Yes	115 (86)			53 (40)		
Ethnicity						
Caucasian	246 (75)			69 (21)		
Asian, African, European, Chinese, other	9 (47)	*	0.01	2 (11)	*	0.39

*Fishers Exact test

Drug taking behaviour: comparisons by prison experience

Previous drug use was significantly associated with number of remands and sentences. Larger proportions of prisoners with greater experience of remands and sentences were significantly more likely than those with less experience of remands and sentences to report drug use. Significantly larger proportions of people with greater experience of remand, sentences and short-term prison sentence than others reported injecting drugs (Table 3.14). There was no statistically significant association between current prison sentence and previous drug use, that is, both short term and long-term prisoners were equally likely to have used drugs.

Table 3.14: Drug taking behaviour: comparison by prison experience

Prison experience	Previous drug use n (%)	X^2	p	Injecting drug use n (%)	X^2	p
Number of prison remands						
≤ 2	91 (71)	4.79	0.03	15 (12)	8.13	0.004
≥ 3	83 (83)			26 (26)		
Number of prison sentences						
≤ 1	96 (64)	12.66	< 0.001	15 (10)	11.27	0.001
≥ 2	106 (84)			32 (25)		
Current prison sentence						
≤ 4 years	126 (77)	1.88	0.17	42 (26)	7.76	0.005
≥ 5 years	105 (70)			20 (13)		

Drug Rehabilitation programme experience

Fifty-three (15%) prisoners reported that they had taken part in a drug rehabilitation programme. Significantly lower percentages of young offenders (5%) compared with adult male (14%) and female prisoners (30%) had taken part in a drug rehabilitation programme, larger proportions of older than younger age groups, those who were unemployed and had been homeless stated they had participated in a drug rehabilitation programme. (Table 3.15).

Table 3.15: Drug rehabilitation: comparison by prison category and demography

	Drug rehabilitation n (%)	X^2	p
Prison category			
Females	26 (30)		
Males	21 (14)	22.82	< 0.001
Young offenders	6 (5)		
Age			
16-24 years	7 (5)		
25- 34 years	18 (23)	21.70	< 0.001
35-44 years	18 (27)		
45+ years	10 (16)		
Employment			
Unemployed	44 (20)		
Employed	9 (9)	10.47	0.005
Education/training			
Marital Status			
Single	41 (16)		
Married/cohabiting	8 (14)	1.18	0.56
Separated/divorced/widowed	2 (8)		
Homelessness			
No	14 (7)	31.15	< 0.001
Yes	39 (29)		

Rehabilitation and prison experience: Significantly greater proportion of prisoners with greater experience of prison sentences (22%) compared with those with less experience of prison sentence times (9%) had taken part in a drug rehabilitation programme. No significant differences were observed with regards to the number of remand times and length of current prison sentence (Table 3.16).

Table 3.16: Drug rehabilitation experience: comparison by prison experience

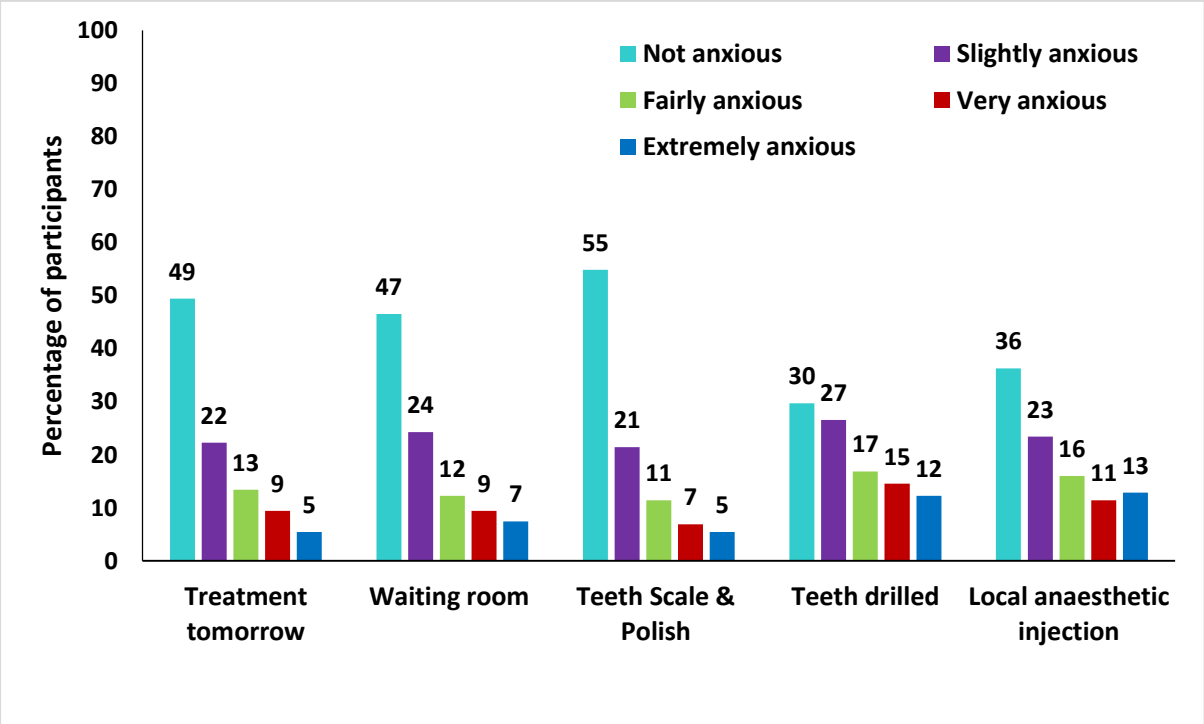
Prison experience	Drug rehabilitation n (%)	X^2	p
Number of prison remands			
≤ 2	14 (11)	3.15	0.08
≥ 3	19 (19)		
Number of prison sentences			
≤ 1	13 (9)	9.76	0.002
≥ 2	28 (22)		
Current prison sentence			
≤ 4 years	27 (17)	0.72	0.40
≥ 5 years	20 (13)		

3.4 Psychosocial health and dental health-related attitudes

3.4.1 Dental Anxiety

The mean dental anxiety score for the total sample was 10.87 (95% CI: 10.28, 11.46). The cut-off for extreme dental anxiety or dental phobia is a score of between 19 and 25. Forty-five participants (13%) scored 19 or above and were categorised as dentally phobic and having extreme dental anxiety. Larger proportions of the participants were extremely anxious about having a local anaesthetic injection (13%) and having their teeth drilled (12%). Least feared items were waiting for the treatment (5%) and having a scale and polish (5%) (Figure 3.5).

Figure 3.5: Percentage of participants who reported dental anxiety by MDAS items



Dental anxiety status: comparison by prison category: The grouping variable prison category significantly explained differences in mean dental anxiety scores. Female prisoners had significantly higher mean MDAS score compared with male prisoners and young offenders (Table 3.17).

Table 3.17: Mean MDAS score comparison by prison category

Prison Category	Dental anxiety (MDAS) Mean (95% CI)	F(df)	p
Females	12.77[2*] (11.46, 14.09)		
Males	10.30[1] (9.45, 11.15)	7.09(2, 347)	0.001
Young offenders	10.14[1] (9.17, 11.11)		

*The suffixes show the significant differences in mean attitude scores between non-identical numeric characters

For each MDAS item the grouping variable prison category significantly explained differences in mean MDAS scores. For each item female prisoners had a significantly higher mean scores compared with male prisoners and male young offenders. Adult male prisoners had significantly lower mean scores compared with women prisoners and male young offenders for 'teeth drilled' and 'local anaesthetic injection' (Table 3.18)

Table 3.18: Comparison of mean dental anxiety scores (MDAS) by prison category

Dental Anxiety items	Prison Category	MDAS Mean (95% CI)	F(df)	p
Treatment tomorrow	Females	2.36[2*] (2.07, 2.66)		
	Males	1.92[1] (1.74, 2.11)	5.98(2, 347)	0.003
	Young Offenders	1.79[1] (1.58, 2.01)		
Waiting room	Females	2.51[2] (2.21, 2.81)		
	Males	1.97[1] (1.77, 2.16)	7.54(2, 347)	0.001
	Young Offenders	1.86[1] (1.64, 2.08)		
Teeth drilled	Females	2.86[2] (2.56, 3.16)		
	Males	2.41[1] (2.19, 2.63)	3.51(2,347)	0.03
	Young Offenders	2.43[1,2] (2.19, 2.68)		
Teeth scaled and polished	Females	2.25[2] (1.96, 2.54)		
	Males	1.75[1] (1.57, 1.94)	6.37(2, 347)	0.002
	Young Offenders	1.72[1] (1.52, 1.91)		
Local anaesthetic injection	Females	2.78[2] (2.46, 3.10)		
	Males	2.25[1] (2.03, 2.46)	4.35(2, 347)	0.01
	Young Offenders	2.34[1,2] (2.08, 2.59)		

*The suffixes show the significant differences in mean attitude scores between non-identical numeric characters

Dental anxiety status: comparison by prison experience: There were no significant differences in the total dental anxiety or individual mean item scores by prison experience (Figures 3.5- 3.7)

Figure 3.5: Mean dental anxiety scores for individual items by remand experience

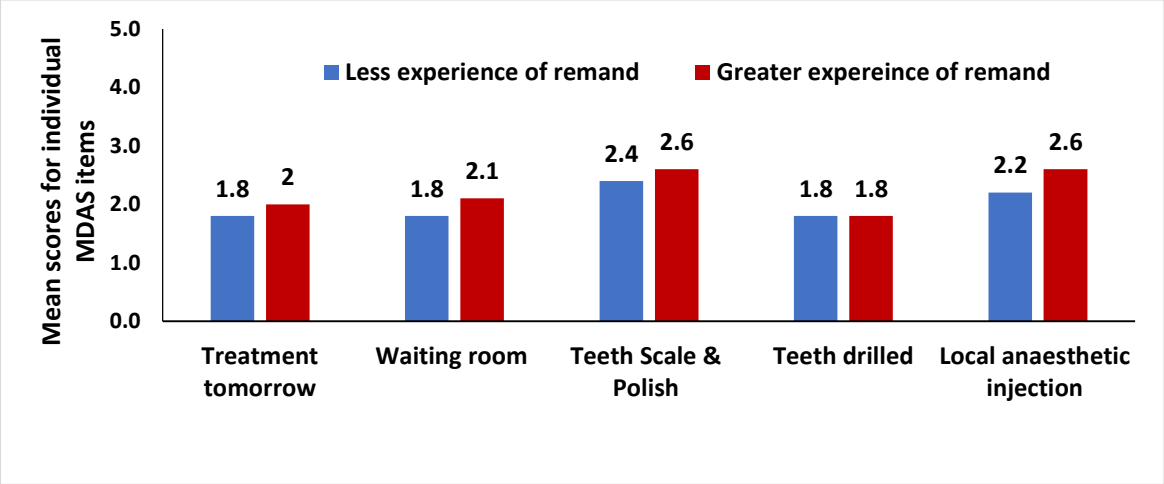


Figure 3.6: Mean dental anxiety scores for individual items by sentence experience

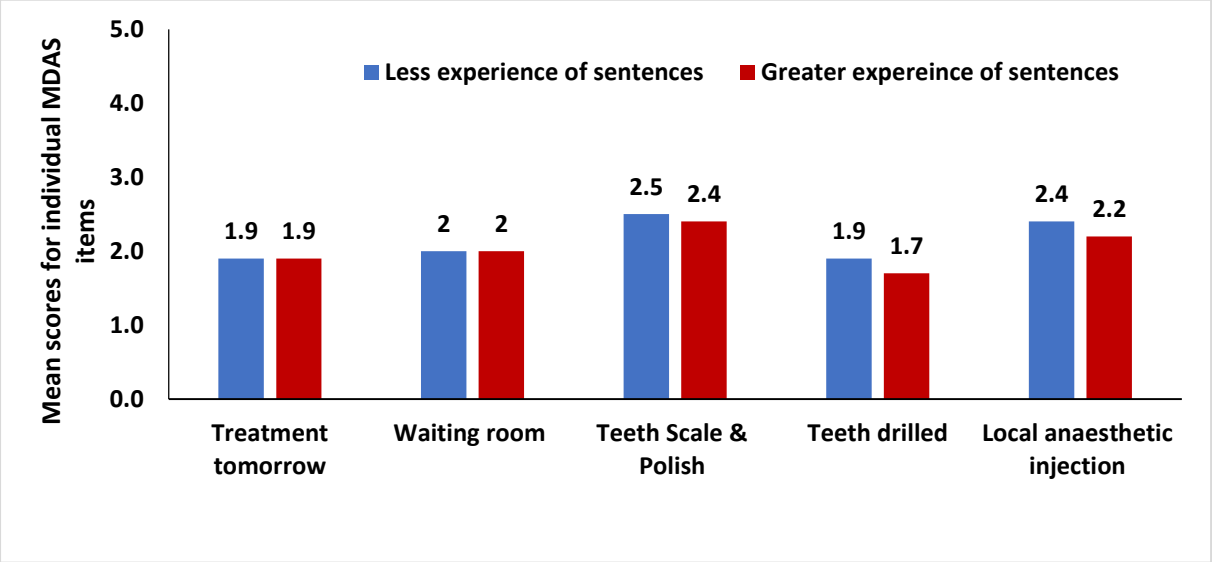
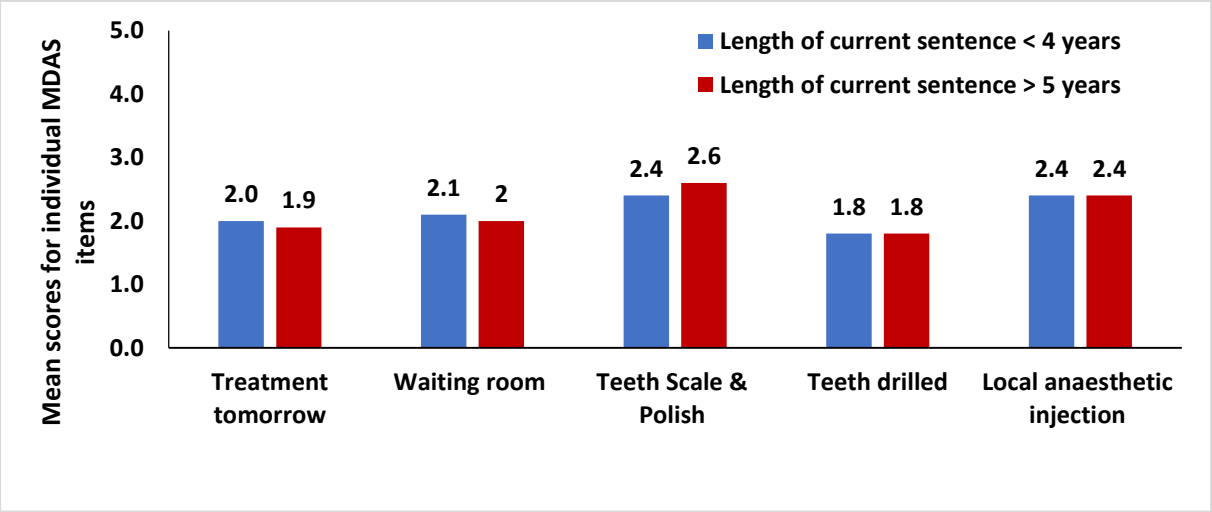


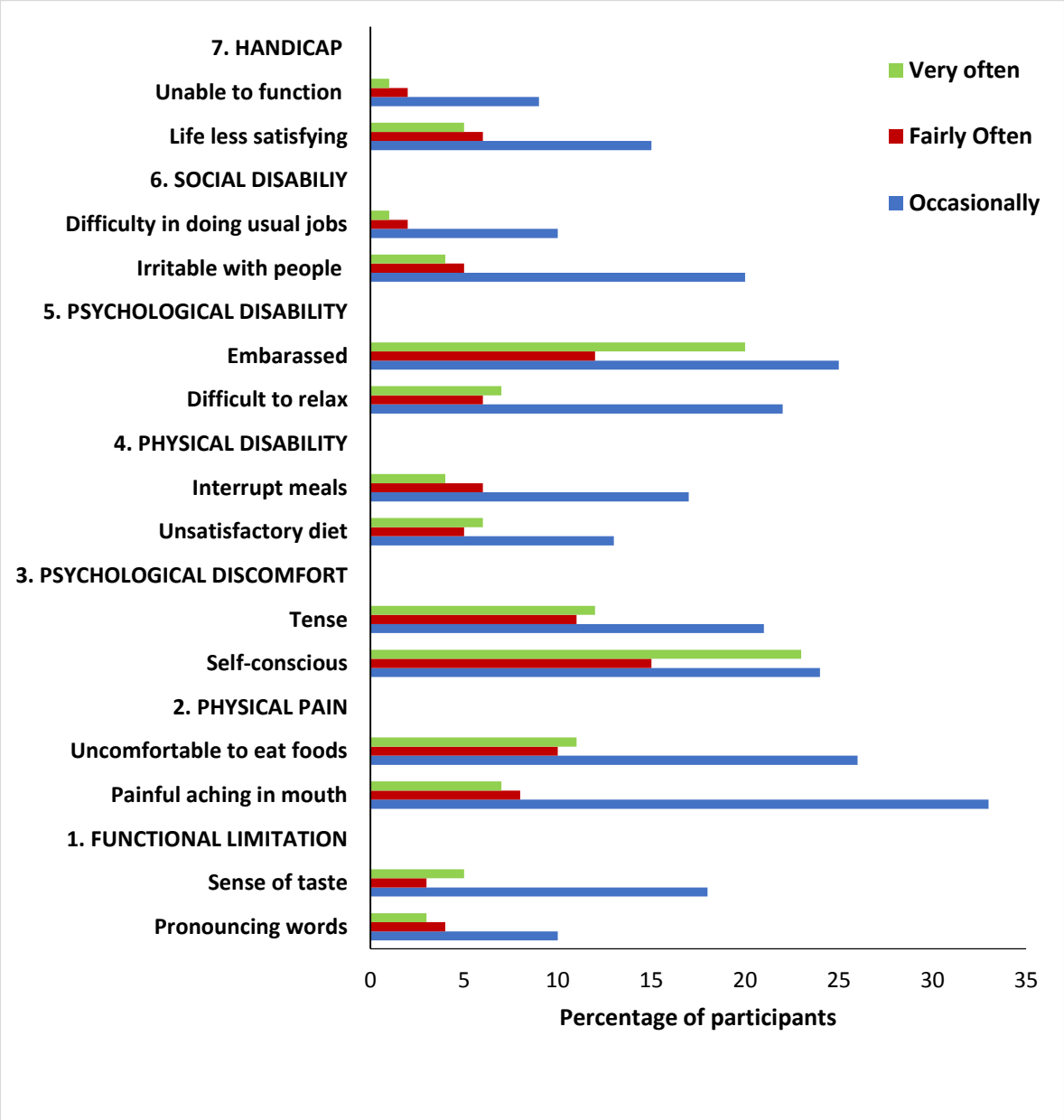
Figure 3.7: Mean dental anxiety scores for individual items by length of current imprisonment



3.4.2 Oral Health Related Quality of Life (OHIP-14)

The mean OHIP-14 total score for 349 participants was 14.42 (95% CI: 13.10, 15.73). Figure 3.8 shows the percentage of prisoners experiencing an oral health impact within the last 12 months. Twenty-three (38%) of respondents reported 'feeling self-conscious' and 32% reported 'feeling embarrassed', very often or fairly often on account of their mouth, teeth or dentures. Occasionally experienced impacts included painful aching in the mouth (33%) and discomfort when eating (26%).

Figure 3.8: Percentage of total sample experiencing oral health impacts



Oral Health-Related Quality of Life: comparisons by prison category: Significant differences were observed between all prison categories for mean OHIP-14 total scores; female prisoners (20±14.24) had a significantly higher total OHIP-14 total score compared with adult male prisoners (15±11.60) and male young offenders (9±10.02) ($F_{[2, 346]}$=20.0; p=<0.001). The grouping variable prison category significantly explained differences in the mean scores for the individual OHIP-14 items for all oral health impact items except for 'trouble pronouncing any words'. Female prisoners had significantly

higher mean scores compared with adult male prisoners and male young offenders as presented in Table 3.19.

Table 3.19**:** Comparison of mean oral health impact scores by prison category

Oral health impacts (OHIP-14 items)	Prison Category	Mean (95% CI)	F(df)	p
Pronouncing words	Females	0.59[1*] (0.35, 0.83)		
	Males	0.63[1] (0.46, 0.80)	0.95 (2, 347)	0.387
	Young Offenders	0.46[1] (0.29, 0.63)		
Sense of taste	Females	1.25[2] (0.96, 1.54)		
	Males	0.66[1] (0.49, 0.83)	12.72 (2, 348)	< 0.001
	Young Offenders	0.50[1] (0.34, 0.66)		
Painful aching in mouth	Females	1.67[2] (1.42, 1.92)		
	Males	1.46[1] (1.26, 1.65)	4.05 (2, 348)	0.018
	Young Offenders	1.21[1] (1.01, 1.41)		
Uncomfortable to eat foods	Females	1.61[2] (1.31, 1.91)		
	Males	1.61[2] (1.38, 1.83)	9.05 (2, 348)	< 0.001
	Young Offenders	0.97[1] (0.76, 1.19)		
Self-conscious	Females	2.47[2] (2.16, 2.78)		
	Males	2.13[2] (1.89, 2.37)	20.58 (2, 347)	< 0.001
	Young Offenders	1.24[1] (0.99, 1.50)		
Tense	Females	1.95[1] (1.64, 2.27)		
	Males	1.49[2] (1.26, 1.72)	19.86 (2, 348)	< 0.001
	Young Offenders	0.78[3] (0.58, 0.99)		
Unsatisfactory diet	Females	1.22[1] (0.91, 1.52)		
	Males	0.78[2] (0.59, 0.98)	12.75 (2, 348)	< 0.001
	Young Offenders	0.40[3] (0.25, 0.54)		
Interrupt meals	Females	1.25[1] (0.98, 1.52)		
	Males	0.87[2] (0.68, 1.06)	11.53 (2, 348)	< 0.001
	Young Offenders	0.49[3] (0.33, 0.65)		
Difficult to relax	Females	1.43[2] (1.14, 1.72)		
	Males	1.16[2] (0.95, 1.38)	10.18 (2, 348)	< 0.001
	Young Offenders	0.68[1] (0.51, 0.86)		
Embarrassed	Females	2.25[2] (1.94, 2.56)		
	Males	1.99[2] (1.76, 2.23)	21.96 (2, 348)	< 0.001
	Young Offenders	1.04[1] (0.79, 1.29)		
Irritable with people	Females	1.36[1] (1.09, 1.64)		
	Males	0.82[2] (0.64, 1.01)	17.88 (2, 348)	< 0.001
	Young Offenders	0.45[3] (0.31, 0.59)		
Difficulty in doing usual jobs	Females	0.81[2] (0.57, 1.05)		
	Males	0.48[1] (0.34, 0.61)	8.90 (2, 348)	< 0.001
	Young Offenders	0.30[1] (0.19, 0.42)		
Life less satisfying	Females	1.20[2] (0.92, 1.49)		
	Males	0.92[2] (0.72, 1.12)	8.77 (2, 348)	< 0.001
	Young Offenders	0.53[1] (0.35, 0.70)		
Unable to function	Females	0.74[2] (0.51, 0.97)		
	Males	0.37[1] (0.24, 0.49)	7.53 (2, 348)	0.001
	Young Offenders	0.32[1] (0.20, 0.44)		

*The suffixes show the significant differences in mean attitude scores between non-identical numeric characters

Oral Health-Related Quality of Life: comparisons by prison experience: Prisoners with greater experience of remands had a significantly higher mean total OHIP-14 scores (16±12.45) compared with

those with less experience of remands (12±11.50) (t= -2.57, p = 0.011). No significant differences were noted in total mean OHIP-14 scores by experience of sentence (t=1.22, p=0.23) and by length of time of current imprisonment (t=0.80, p=0.42).
Prisoners with greater experience of remand (three or more) had significantly higher mean scores for eight items of OHIP-14 compared with prisoners with less experience of remand (Table 3.20). Prisoners with more experience of sentences had significantly higher mean scores for the oral health impacts feeling 'tense' and 'life less satisfying' on account of their teeth, mouth and dentures, whereas those with shorter compared to longer current length of imprisonment had significantly higher mean scores for the oral health impacts of 'difficult doing usual jobs' and 'unable to function' because of their teeth, mouth and dentures.

Table 3.20: Comparison of mean oral health impact scores by prison experience

Oral health impacts (OHIP-14 items)	Number of remands	Mean (SD)	t	p
Sense of taste	≤ 2 remands	0.59 (1.13)	2.61	0.01§
	≥ 3 remands	0.98 (1.12)		
Self-conscious	≤ 2 remands	1.67 (1.51)	2.51	0.01
	≥ 3 remands	2.17 (1.50)		
Tense	≤ 2 remands	1.05 (1.29)	3.33	0.001
	≥ 3 remands	1.67 (1.49)		
Unsatisfactory diet	≤ 2 remands	0.54 (1.00)	2.29	0.02
	≥ 3 remands	0.90 (1.29)		
Interrupt meals	≤ 2 remands	0.67 (1.08)	2.09	0.04
	≥ 3 remands	0.99 (1.22)		
Difficult to relax	≤ 2 remands	0.87 (1.21)	2.08	0.04
	≥ 3 remands	1.21 (1.26)		
Embarrassed	≤ 2 remands	1.48 (1.46)	2.07	0.04
	≥ 3 remands	1.89 (1.50)		
Life less satisfying	≤ 2 remands	0.62 (0.99)	2.11	0.04
	≥ 3 remands	0.94 (1.24)		
	Number of sentences	**Mean (SD)**	**t**	**p**
Tense	≤ 1 sentence	1.17 (1.21)	2.45	0.02
	≥ 2 sentences	1.58 (1.50)		
Life less satisfying	≤ 1 sentence	0.72 (0.90)	2.00	0.05
	≥ 2 sentences	1.02 (0.84)		
	Imprisonment length	**Mean (SD)**	**t**	**p**
Difficulty in doing usual jobs	≤ 4 years	0.60 (0.98)	2.54	0.01
	≥ 5 years	0.36 (0.70)		
Unable to function	≤ 4 years	0.52 (0.92)	2.39	0.02
	≥ 5 years	0.31 (0.67)		

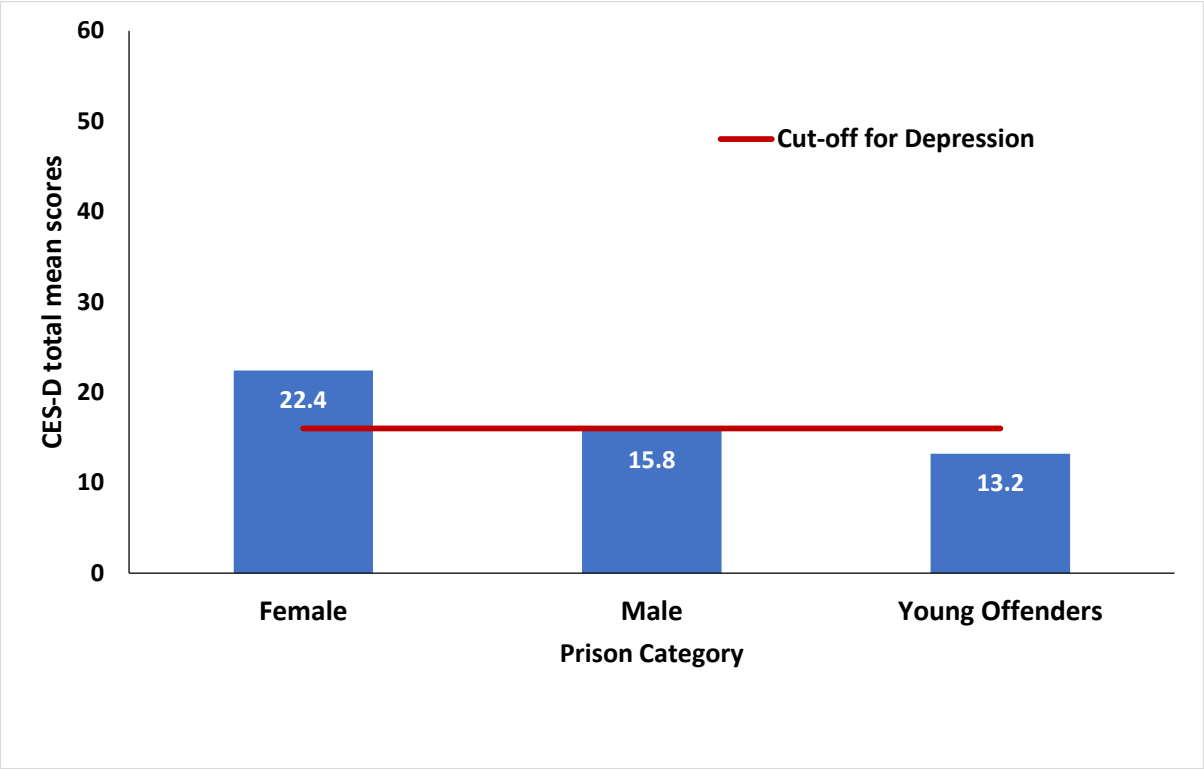
§: items with significant values only reported

3.4.3 Depression

Three hundred and thirty-nine respondents (96%) answered all items of the CES-D scale. The mean CES-D score for the total sample was 16.51 (95% CI: 15.17, 17.85). One hundred and thirty-nine

participants (39%) scored 16 or above, suggesting that they were suffering from a depressive illness (Figure 3.9).

Figure 3.9: Comparison of CES-D total mean scores by prison category



Depression: comparisons by prison category: The grouping variable prison category significantly explained differences in CES-D total mean score (Figure 3.9). Female prisoners (22.4; 95% CI: 19.3, 25.7) had a significantly higher CES-D total mean score compared with male prisoners (15.8; 95% CI: 13.7, 17.8) and young offenders (13.2; 95% CI: 11.4, 14.9) ($F_{[2, 336]} = 14.3$; $p = <0.001$).

There was no significant difference in the total mean CES-D scores between male prisoners and male young offenders. Female prisoners had significantly higher mean scores for the following CES-D items: 'bothered by things', 'poor appetite', 'couldn't shake off blues', 'trouble keeping mind on task', 'felt depressed', 'everything was effort', 'fearful', 'crying spells', 'felt sad', 'people dislike me' and 'could not get going' than the male prisoners and young offenders, and significantly higher mean scores for CES-D items 'life has been a failure', 'sleep restless', 'talked less than usual' and 'felt lonely' compared with male young offenders only. Male prisoners had a significantly higher mean scores for CES-D items: 'couldn't shake off blues', 'felt depressed', 'life has been a failure', 'sleep restless' and' felt sad' than male young offenders but not female prisoners, whereas male young offenders had a significantly higher mean scores for the CES-D item 'hopeful about future' compared with male prisoners only (Table 3.21).

Depression: comparisons by prison experience: Remand times, sentence times and current length of imprisonment did not significantly explain differences in total CES-D score. Comparisons of mean scores for individual CES-D items showed that prisoners with greater experience of remand had significantly higher mean scores for 'people dislike me' ($t = -2.30$, $p = 0.02$) and 'could not get going' ($t= -2.22$, $p= 0.03$) than those with less experience of remand. Prisoners with shorter prison sentences had significantly higher mean scores for items 'was happy' ($t= 2.60$, $p = 0.01$) and 'enjoyed life' (t=

2.78, p=0.006) compared with those with longer sentences, while the number of prison sentences did not significantly explain differences in mean CES-D individual items scores (Table 3.22).

Table 3.21: Mean CES-D score for individual items: comparison by prison category

Individual CES-D items	Prison category	Mean	95% CI	F(df)	p
Bothered by things	Female	1.05[2]*	0.80, 1.29	14.97 (2, 344)	< 0.001
	Male	0.60[1]	0.45, 0.76		
	Young Offenders	0.32[1]	0.19, 0.46		
Poor appetite	Female	0.93[2]	0.70, 1.16	12.05 (2, 343)	< 0.001
	Male	0.53[1]	0.38, 0.67		
	Young Offenders	0.33[1]	0.22, 0.45		
Couldn't shake off blues	Female	1.00[3]	0.76, 1.24	13.88 (2, 342)	< 0.001
	Male	0.66[2]	0.50, 0.81		
	Young Offenders	0.31[1]	0.18, 0.43		
As good as other people	Female	1.61[1]	1.34, 1.89	1.73 (2, 340)	0.18
	Male	1.32[1]	1.11, 1.53		
	Young Offenders	1.56[1]	1.31, 1.81		
Trouble keeping mind on task	Female	1.11[2]	0.87, 1.35	4.22 (2, 341)	0.02
	Male	0.77[1]	0.61, 0.93		
	Young Offenders	0.71[1]	0.53, 0.89		
Felt depressed	Female	1.23[1]	0.98, 1.48	11.16 (2, 344)	< 0.001
	Male	0.87[2]	0.69, 1.05		
	Young Offenders	0.52[3]	0.34, 0.69		
Everything was effort	Female	1.10[2]	0.86, 1.35	13.08 (2, 343)	< 0.001
	Male	0.71[1]	0.55, 0.86		
	Young Offenders	0.41[1]	0.28, 0.55		
Hopeful about future	Female	1.67[1,2]	1.42, 1.93	7.19 (2, 343)	0.001
	Male	1.30[1]	1.10, 1.50		
	Young Offenders	1.85[2]	1.64, 2.06		
Life been failure	Female	1.05[2]	0.81, 1.28	8.94 (2, 342)	< 0.001
	Male	0.75[1,2]	0.58, 0.93		
	Young Offenders	0.44[1]	0.29, 0.59		
Fearful	Female	0.85[2]	0.62, 1.08	11.49 (2, 342)	< 0.001
	Male	0.47[1]	0.32, 0.62		
	Young Offenders	0.26[1]	0.14, 0.37		
Sleep restless	Female	1.34[2]	1.08, 1.60	5.24 (2, 341)	0.006
	Male	1.27[2]	1.08, 1.47		
	Young Offenders	0.87[1]	0.66, 1.07		
Was happy	Female	1.46[1]	1.21, 1.71	1.10 (2, 341)	0.33
	Male	1.24[1]	1.05, 1.43		
	Young Offenders	1.39[1]	1.18, 1.60		
Talked less than usual	Female	1.00[2]	0.77, 1.23	5.30 (2, 340)	0.005
	Male	0.75[1,2]	0.58, 0.91		
	Young Offenders	0.54[1]	0.38, 0.71		
Felt lonely	Female	0.94[2]	0.71, 1.17	5.92 (2, 340)	0.003
	Male	0.76[1,2]	0.59, 0.93		
	Young Offenders	0.46[1]	0.31, 0.62		
People were unfriendly	Female	0.55[1]	0.36, 0.73	2.21 (2, 341)	0.11
	Male	0.37[1]	0.25, 0.49		
	Young Offenders	0.33[1]	0.19, 0.47		
Enjoyed life	Female	1.54[1]	1.30, 1.78	1.74 (2, 340)	0.18
	Male	1.26[1]	1.06, 1.46		
	Young Offenders	1.45[1]	1.23, 1.66		
Crying spells	Female	0.97[2]	0.73, 1.20	21.77 (2, 341)	< 0.001
	Male	0.30[1]	0.18, 0.42		
	Young Offenders	0.28[1]	0.15, 0.41		
Felt sad	Female	1.20[3]	0.96, 1.44	15.70 (2, 341)	< 0.001
	Male	0.82[2]	0.65, 0.98		
	Young Offenders	0.43[1]	0.28, 0.57		
People dislike me	Female	0.95[2]	0.72, 1.19	14.70 (2, 341)	< 0.001
	Male	0.40[1]	0.28, 0.53		
	Young Offenders	0.35[1]	0.21, 0.48		
Could not get going	Female	1.00[2]	0.76, 1.24	10.83 (2, 340)	< 0.001
	Male	0.63[1]	0.49, 0.77		
	Young Offenders	0.41[1]	0.27, 0.55		

*The suffixes show the significant differences in mean attitude scores between non-identical numeric characters

Table 3.22: Comparison of mean scores for CES-D individual items by prison experience

Individual CES-D items	Number of remands	Mean	SD	t	p
People dislike me	≤ 2 remands	0.39	0.76	2.30	0.02§
	≥ 3 remands	0.67	0.98		
Could not get going	≤ 2 remands	0.47	0.80	2.22	0.03
	≥ 3 remands	0.73	0.94		
	Imprisonment length	**Mean**	**SD**	**t**	**p**
Was happy	≤ 4 years	1.48	1.19	2.60	0.01
	≥ 5 years	1.15	1.00		
Enjoyed life	≤ 4 years	1.52	1.17	2.78	0.006
	≥ 5 years	1.16	1.13		

§: Items with significant values only reported

3.4.4 Oral Health-related attitudes: dental treatment

A series of questions were used to assess attitudes to dental treatment on a 4-point Likert scale where options ranged from 'don't feel like that' coded as 1 to 'definitely feel like that' coded as 4. The scores for the seven oral health-related attitudes to dental treatment were summed to form an attitudinal scale with scores ranging from seven to 28. The mean score of oral health-related attitudes was 14.17 (95% CI: 13.66, 14.68). The grouping variable 'prison category' significantly explained differences in oral health-related attitudes ($F_{[2,343]}$= 3.42; p=0.03). Female prisoners (15.33; 95% CI: 14.17, 16.50) had significantly higher mean scores for oral health related attitudes compared with male prisoners (13.64; 95% CI: 12.90, 14.39) only, however, no significant difference in mean scores was noted between the women and young offenders (14.00; 95% CI: 13.14, 14.86).

The mean scores of each individual oral health-related attitude is presented in Table 3.23. Attitude 4 'I'd like to know more about what the dentist is going to do and why' had the highest score.

Table 3.23**:** Oral health related attitudes to dental treatment

		Mean (95% CI)
Attitude 1	If I had toothache I'd rather take painkillers than go to the dentist	2.19 (2.06, 2.32
Attitude 2	The worst part of going to the dentist is waiting	2.32 (2.20, 2.45)
Attitude 3	Going to the dentist is like being processed on a conveyor belt	1.70 (1.60, 1.80)
Attitude 4	I'd like to know more what the dentist is going to do and why	2.57 (2.44, 2.70)
Attitude 5	I don't like fancy (intricate) dental treatment	1.89 (1.78, 2.00)
Attitude 6	I don't like lying flat in the dental chair	1.66 (1.55, 1.77)
Attitude 7	I find NHS dental treatment difficult to find outside of prison	1.84 (1.73, 1.96)

Oral health-related attitudes: comparisons by prison category: The grouping variable prison category significantly explained differences in the mean oral health-related attitude scores for Attitude 1 'If I had toothache I'd rather take painkillers than go to the dentist', Attitude 4 'I'd like to know more what the dentist is going to do and why' and Attitude 6 'I don't like lying flat in the dental chair'. Female prisoners had significantly higher mean scores for Attitude 1, 4 and 6 compared with young offenders and males (Table 3.24).

Table 3.24**:** Comparison of mean oral health-related attitudes by prison category

	Female Mean (95% CI)	Male Mean (95% CI)	Young offender Mean (95% CI)	F(df)	p
Attitude 1	2.47 (2.21, 2.73)[2*]	1.88 (1.69, 2.08)[1]	2.40 (2.18, 2.61)[2]	9.00 (2, 346)	<0.001
Attitude 2	2.24 (1.99, 2.48)[1]	2.47 (2.26, 2.67)[1]	2.19 (1.98, 2.40)[1]	2.05 (2, 344)	0.13
Attitude 3	1.83 (1.59, 2.06)[1]	1.63 (1.47, 1.79)[1]	1.71 (1.56, 1.86)[1]	1.23 (2, 345)	0.33
Attitude 4	2.85 (2.60, 3.10)[2]	2.55 (2.35, 2.75)[1,2]	2.40 (2.19, 2.61)[1]	3.68 (2, 345)	0.03
Attitude 5	2.02 (1.78, 2.27)[1]	2.55 (2.35, 2.75)[1]	2.40 (2.19, 2.61)[1]	1.23 (2, 346)	0.29
Attitude 6	1.91 (1.65, 2.16)[2]	1.48 (1.32, 1.64)[1]	1.70 (1.51, 1.88)[1,2]	4.74 (2, 356)	0.009
Attitude 7	2.07 (1.81, 2.33)[2]	1.84 (1.66, 2.01)[1,2]	1.71 (1.54, 1.87)[1]	2.90 (2, 345)	0.06

*The suffixes show the significant differences in mean attitude scores between non-identical numeric characters.

Oral health-related attitudes: comparison by prison experience: Prisoners who had greater experience of remands had a significantly higher mean oral health-related attitude for Attitude 7 'I find NHS dental treatment difficult to find outside of prison'. Differences in mean scores for Attitude 4, 'I'd like to know more what the dentist is going to do and why?', was significant at the 6% level between those with greater remand compared with those with less remand experience. Prisoners who were on shorter term prison sentences of less than four years had a significantly higher mean scores for Attitude 1 'If I had toothache I'd rather take painkillers than go to the dentist' and Attitude 7 'I find NHS dental treatment difficult to find outside of prison' compared with prisoners on long-term current prison sentence. No other significant differences were shown for the reported number of prison sentences (Table 3.25).

Table 3.25: Comparison of oral health-related attitudes by prison experience

	Number of remands	Mean (SD)	t	p
Attitude 4	≤ 2 remands	2.43 (1.23)	-1.87	0.06§
	≥ 3 remands	2.72 (1.16)		
Attitude 7	≤ 2 remands	1.77 (1.04)	-2.20	0.03
	≥ 3 remands	2.10 (1.17)		
	Imprisonment length	**Mean (SD)**	**t**	**p**
Attitude 1	≤ 4 years	2.32 (1.19)	2.42	0.02
	≥ 5 years	1.99 (1.22)		
Attitude 7	≤ 4 years	1.98 (1.13)	2.31	0.02
	≥ 5 years	1.70 (0.99)		

§: Items with significant values only reported

3.5 Dental health behaviours

3.5.1 Dental attendance behaviours

Seventy-four percent of participants (253) reported that they had attended a dental practice either inside or outside the prison within the previous year and 15% reported that they had attended a dental practice within a two year period. Smaller proportions reported that they attended a dental practice between two and five years ago (8%) and 3% had either never been to a dentist or their last visit was more than five years ago. The reasons for their dental visit included trouble with teeth or gums (48%), routine dental examination (35%), other reasons (11%) concerning issues with dentures or scale and polish and about 7% couldn't recollect the reason of their last dental visit.

3.5.2 Accessing prison dental services and perceived barriers to accessing prison dental services

Seventy-eight percent (270) prisoners stated that they had accessed dental services inside the prison. On asking about the barriers to accessing dental services inside the prison the responses were: 'difficulty in accessing the service (appointment)' (40%), 'infrequent nature of the dentists' treatment schedule' (32%), 'disliking the prison dental service' (6%), 'difficulty in getting a request form' (5%) and 'difficulty in completing a request form' (3%). Twenty four percent stated were 'dental anxious', 'not liking dentist in general' or 'feared of going to dentist' and 'unsatisfactory previous treatment', as additional barriers to accessing dental care.

3.5.3 Reported dental treatment experiences

Table 3.26 shows details of the various dental treatments received by participants. More than 50% of the participants stated that they have had an injection in their gum (local anaesthetic agent), fillings, their teeth x-rayed, extractions and scale and polish at some point in their life.

Table 3.26: Self-reported treatments ever received

Treatment type	**Treatment received** n (%)
Injection in gum	315 (92)
Fillings	309 (90)
X-rays	278 (83)
Extractions	247 (77)
Scale and polish	234 (74)
Abscess	128 (42)
Fissure sealant	101 (41)
General anaesthetic	101 (34)
Fluoride treatment	93 (35)
Dentures	89 (28)
Crowns	78 (27)
Inhalational sedation	66 (22)
IV sedation	44 (14)
Bridge work	34 (12)

Dental treatment experience: comparisons by prison category: To compare dental treatment experience by prison category and prison experience the treatments listed in Table 3.27 were divided into three broad categories (i) Dental treatment (fillings, extractions, dentures, crown and bridge work); (ii) preventive treatment (fluoride treatment, fissure sealant and scale and polish) and (iii) treatment for dental anxiety (IV sedation and inhalation sedation).

Comparison of self-reported treatment by prison category (Table 3.27) showed that significantly larger proportion of male prisoners reported to have experience of fillings, extractions and crowns compared with female and male young offenders, whereas significantly larger proportions of females reported to have experience of dentures compared to males and young offenders. With regards to preventive treatment significantly larger proportions of female prisoners reported to have had fluoride treatments, and male prisoners, scale and polishes. Significantly greater proportions of female prisoners reported to have had IV sedation compared with male and young offenders.

Table 3.27: Self-reported treatment type experience: comparison by prison category

	Females	Males	Young offenders	X^2	p
Treatment type	**Treatment received** n (%)	**Treatment received** n (%)	**Treatment received** n (%)		
Dental					
Fillings	79 (93)	138 (95)	92 (83)	10.68	0.005
Extractions	67 (83)	125 (89)	55 (55)	39.27	<0.001
Dentures	32 (42)	49 (36)	8 (8)	30.12	<0.001
Crowns	20 (27)	43 (34)	15 (16)	9.35	0.009
Bridge work	9 (13)	19 (15)	6 (7)	4.11	0.13
Preventive					
Fluoride treatment	35 (52)	37 (31)	21 (26)	12.38	0.002
Fissure sealant	30 (48)	41 (39)	30 (37)	1.77	0.41
Scale and polish	62 (81)	114 (84)	58 (56)	25.31	<0.001
Dental anxiety					
IV sedation	15 (19)	10 (7)	44 (14)	9.14	0.01
Inhalation sedation	20 (26)	28 (22)	18 (18)	1.77	0.41

Dental treatment experience: comparisons by prison experience: No significant differences in treatment type were observed by remand times (Table 3.28). Significantly larger proportions of prisoners, however, with less prison experience, reported to have greater experience of fillings compared with those having more experience of prison; whereas prisoners with greater experience of remand had greater experience of having dentures and inhalation sedation (Table 3.29).

Comparison of treatment type by current length of imprisonment showed that significantly greater proportions of prisoners with longer current length of imprisonment (≥ 5 years) compared with prisoners with shorter-term sentences had greater experience of extractions and dentures and experience of preventive treatments, such as scale and polish (Table 3.30).

Table 3.28**:** Self- reported dental treatment by remand times

	≤2 remands	≥3 remands		
Treatment type	**Treatment received** n (%)	**Treatment received** n (%)	X^2	p
Dental				
Fillings	106 (54)	89 (46)	2.06	0.15
Extractions	86 (54)	72 (46)	0.88	0.35
Dentures	25 (45)	30 (55)	3.27	0.07
Crowns	28 (57)	21 (43)	0.07	0.79
Bridge work	8 (40)	12 (60)	2.93	0.09
Preventive				
Fluoride treatment	24 (45)	29 (55)	2.11	0.15
Fissure sealant	29 (46)	34 (54)	2.10	0.15
Scale and polish	84 (55)	68 (45)	0.19	0.66
Dental anxiety				
IV sedation	15 (65)	8 (35)	0.72	0.40
Inhalation sedation	26 (55)	21 (45)	0.24	0.63

Table 3.29**:** Self- reported dental treatment by sentence times

	≤1 sentence	≥2 sentences		
Treatment type	**Treatment received** n (%)	**Treatment received** n (%)	X^2	**p**
Dental				
Fillings	128 (52)	119 (48)	4.73	0.03
Extractions	101 (51)	97 (49)	1.65	0.20
Dentures	32 (44)	41 (56)	4.59	0.03
Crowns	38 (57)	29 (43)	0.16	0.69
Bridge work	12 (48)	13 (52)	0.46	0.50
Preventive				
Fluoride treatment	37 (51)	36 (49)	0.44	0.51
Fissure sealant	39 (46)	45 (54)	2.73	0.10
Scale and polish	105 (53)	92 (47)	0.67	0.42
Dental anxiety				
IV sedation	14 (45)	17 (55)	1.38	0.24
Inhalation sedation	21 (43)	28 (57)	3.86	0.05

Table 3.30: Self- reported dental treatment by current length of imprisonment

	Less than 4 years	More than 5 years		
Treatment type	**Treatment received** n (%)	**Treatment received** n (%)	X^2	**p**
Dental				
Fillings	139 (50)	141 (50)	2.18	0.14
Extractions	102 (46)	122 (54)	12.8	<0.001
Dentures	31 (40)	47 (60)	6.80	0.009
Crowns	31 (45)	38 (55)	2.04	0.15
Bridge work	12 (40)	18 (60)	1.41	0.23
Preventive				
Fluoride treatment	44 (53)	39 (47)	0.01	0.91
Fissure sealant	43 (49)	44 (51)	1.26	0.26
Scale and polish	91 (43)	120 (57)	19.5	<0.001
Dental anxiety				
IV sedation	25 (63)	15 (37)	2.51	0.11
Inhalation Sedation	37 (60)	25 (40%)	2.67	0.10

3.5.4 Reported dental treatment preferences

Eighty-nine percent (305) reported that they would prefer their front teeth to be crowned than extracted, whereas 77% (264) reported that they would prefer their back teeth to be filled than extracted. No significant differences were found between treatment preferences either for painful front tooth or back tooth between prison categories, however, for both treatment preferences greater proportions of male younger offenders followed by female and then adult male prisoners reported that they would prefer their front tooth and back tooth to be filled or crowned. Dental treatment preferences did not vary significantly by prison experience.

3.5.5 Reported toothbrushing behaviours

Eighty-one percent (283) of the prisoners stated that they brushed their teeth at home and 89% (311) stated that they brushed their teeth in prison; 73% stated that the brushed their teeth both at home and in prison. Significantly lower proportions of male young offenders stated that they brushed their teeth at home compared with female and adult male prisoners (Table 3.31).

Table 3.31: Oral health behaviour: Tooth brushing behaviour at home and in prison

Prison category	**Females** n (%)	**Males** n (%)	**Young offenders** n (%)	X^2	**p**
Brush teeth at home	71 (82)	109 (75)	103 (89)	8.44	0.02
Brush teeth in prison	76 (87)	130 (89)	105 (91)	0.51	0.77

3.5.6 Reported sugar consumption behaviours

Thirty three percent (115) of the responders avoided snacking on sugary foods and drinks at home and 40% (139) stated that they avoided sugary foods and drinks in prison. No significant difference was observed among prison categories and their reported snacking behaviour at home or in the prison (Table 3.32).

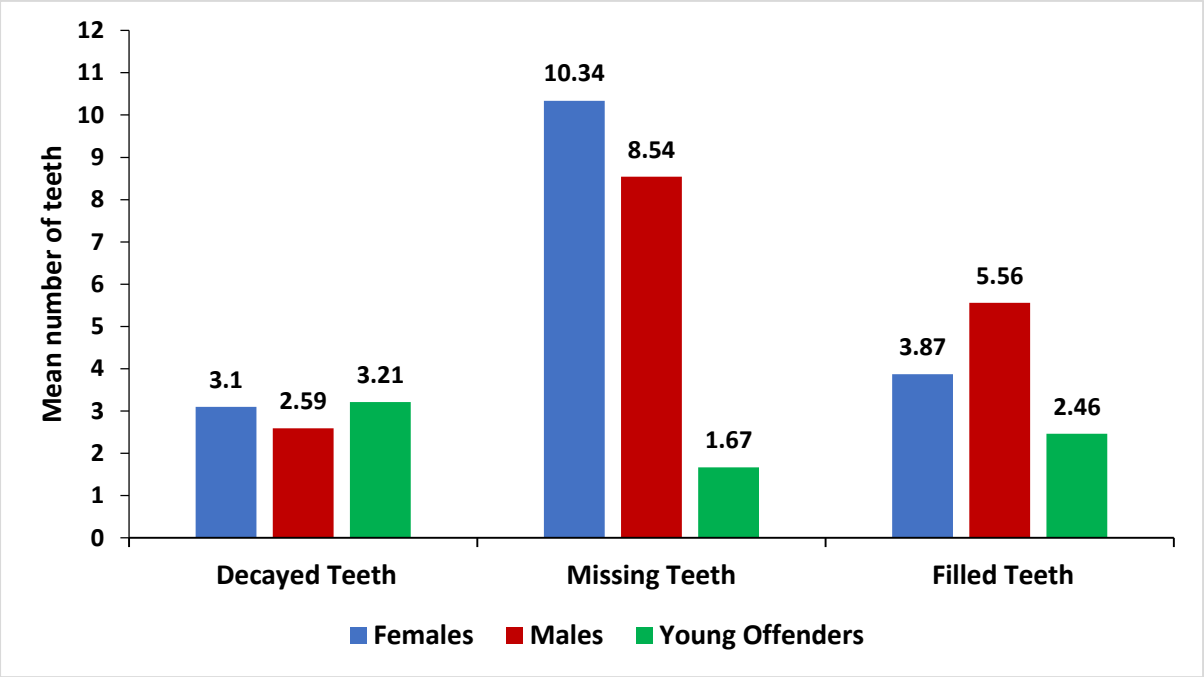
Table 3.32: Oral health behaviour: Snacking behaviour at home and in prison

Prison category	**Females** n (%)	**Males** n (%)	**Young offenders** n (%)	X^2	**p**
Avoid sugar: home	30 (26)	47 (32)	38 (33)	0.13	0.94
Avoid sugar: prison	32 (23)	59 (42)	48 (35)	0.47	0.79

3.6 Dental decay experience

The mean numbers of decayed, missing and filled teeth are presented in Figure 3.10. The overall mean $D_{3CV}MFT$ was 13.70, the mean number of decayed teeth into dentine was 2.93, the mean number of filled teeth was 4.09 and the mean numbers of missing teeth was 6.68. Missing teeth (MT) contributed to 49% of the total dental decay experience, decayed into dentine contributed to 21% of the total dental decay experience and the care index (FT/ $D_{3CV}MFT$) was 30%.

Figure 3.10: Mean number of Decayed ($D_{3CV}T$), Missing (MT) and Filled Teeth (FT)



A comparison of the prisoners' total dental decay experience ($D_{3CV}MFT$) by prison category (Table 3.33), showed that the grouping variable prison category significantly explained differences in the mean dental decay experience, missing and filled teeth. No significant difference was observed between the prison categories for the mean number of decayed teeth into dentine. Male young offenders had a significantly lower overall mean for $D_{3CV}MFT$ and for missing and filled teeth compared with adult male and female prisoners.

Table 3.33: Dental decay experience: comparisons between prison categories

	Prison category	Mean number of teeth	95% CI		F(df)	p
Dental decay experience ($D_{3CV}MFT$)	**Females (n=87)**	17.32[2*]	15.34	19.30	60.14 (2, 345)	<0.001
	Males (n=144)	16.68[2]	15.32	18.04		
	Young Offenders (n=117)	7.32[1]	6.34	8.31		
Decayed teeth ($D_{3CV}T$)	**Females (n=87)**	3.10[1]	2.22	3.99	1.18 (2, 345)	0.310
	Males (n=144)	2.59[1]	2.13	3.05		
	Young Offenders (n=117)	3.21[1]	2.54	3.87		
Missing Teeth (MT)	**Females (n=87)**	10.34[2]	8.18	12.51	40.94 (2, 245)	<0.001
	Males (n=144)	8.54[2]	7.20	9.89		
	Young Offenders (n=117)	1.67[1]	1.12	2.21		
Filled Teeth (FT)	**Females (n=87)**	3.87[2]	3.13	4.62	24.49 (2, 245)	<0.001
	Males (n=144)	5.56[3]	4.85	6.26		
	Young Offenders (n=117)	2.46[1]	1.99	2.93		

*The suffixes show the significant difference in mean between groups with non-identical numeric characters

Dental decay experience: comparison by prison experience: Prisoners with greater experience of remands and shorter length of current imprisonment had significantly more mean number of decayed teeth than those with less experience of remands or shorter-term sentence. Prisoners with longer length of current imprisonment compared to those with shorter-term sentences had significantly greater mean D_{3CV}MFT and filled teeth. No other significant differences were shown (Table 3.34).

Table 3.34: Dental decay experience: comparisons by prison experience

	Remand times	**n**	**Mean(sd)**	**t**	**p**
D_{3CV}MFT	≤ 2 Remands	129	12.23(8.69)	-1.79	0.08
	≥ 3 Remands	96	14.42(9.34)		
D_{3CV}T	≤ 2 Remands	129	2.38(3.19)	-3.13	0.002
	≥ 3 Remands	96	3.92(3.94)		
MT	≤ 2 Remands	129	5.53(8.08)	-1.39	0.17
	≥ 3 Remands	96	7.10(8.75)		
FT	≤ 2 Remands	129	4.33(3.99)	1.84	0.07
	≥ 3 Remands	96	3.41(3.50)		
	Sentence times	**n**	**Mean(sd)**	**t**	**p**
D_{3CV}MFT	≤ 1 sentence	151	12.84(8.97)	-1.99	0.05
	≥ 2 sentences	123	15.04(9.21)		
D_{3CV}T	≤ 1 sentence	151	2.77(3.51)	0.05	0.96
	≥ 2 sentences	123	2.76(3.40)		
MT	≤ 1 sentence	151	5.95(8.22)	-1.73	0.09
	≥ 2 sentences	123	7.72(8.67)		
FT	≤ 1 sentence	151	4.13(3.99)	-0.92	0.36
	≥ 2 sentences	123	4.57(3.95)		
	Length of stay	**n**	**Mean(sd)**	**t**	**p**
D_{3CV}MFT	Short Term	161	12.65(9.05)	-2.32	0.02
	Long Term	150	14.98(8.70)		
D_{3CV}T	Short Term	161	3.55(3.85)	3.95	<0.001
	Long Term	150	2.10(2.55)		
MT	Short Term	161	5.99(8.45)	-1.72	0.09
	Long Term	150	7.64(8.39)		
FT	Short Term	161	3.11(3.02)	-5.17	<0.001
	Long Term	150	5.25(4.22)		

Dental decay experience: comparison by prescribed mediation and history of drug use: Dental decay experience was compared across prescribed medication, drug use, injecting drug use and experience of drug rehabilitation. Prisoners who had been prescribed medication had significantly greater mean D_{3CV}MFT, missing and filled teeth than others. Those who reported previous drug use than those who did not report a history of drug use had significantly greater mean numbers of decayed teeth. The mean number of filled teeth was significantly higher among those who did not report a history of drug use, whereas those who had injected drugs had a significantly greater mean D_{3CV}MFT, decayed and missing teeth compared with those who stated that they had not injected drugs. Those who had taken part in a drug rehabilitation programme had significantly greater D_{3CV}MFT, decayed and missing teeth than those who had not (Table 3.35).

Table 3.35: Dental decay experience: comparisons by prescribed medication and history of drug use

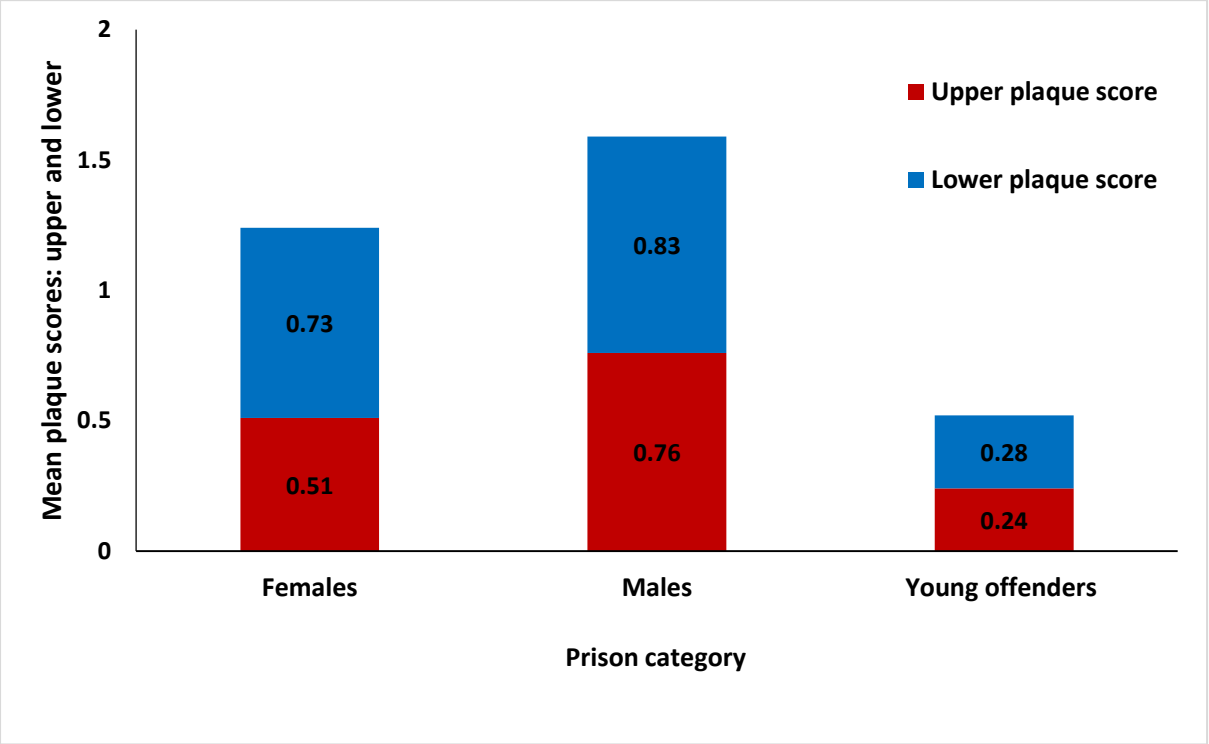
	Prescribed medication	**Mean**	**SD**	**t**	**p**
$D_{3cv}MFT$	No (n= 135)	10.47	7.70	-5.80	<0.001
	Yes (n= 196)	15.89	9.24		
$D_{3cv}T$	No (n= 135)	3.35	3.79	1.73	0.09
	Yes (n= 196)	2.66	3.22		
MT	No (n= 135)	3.55	5.51	-6.42	<0.001
	Yes (n= 196)	8.82	9.38		
FT	No (n= 135)	3.59	3.36	-2.04	<0.042
	Yes (n= 196)	4.42	4.03		
	Previous drug use	**Mean**	**SD**	**t**	**p**
$D_{3cv}MFT$	No (n= 89)	14.58	9.18	1.05	0.30
	Yes (n= 252)	13.40	8.92		
$D_{3cv}T$	No (n= 89)	1.94	2.39	-3.92	<0.001
	Yes (n= 252)	3.30	3.73		
MT	No (n= 89)	7.22	8.59	0.70	0.49
	Yes (n= 252)	6.49	8.27		
FT	No (n= 89)	5.42	4.38	3.49	0.001
	Yes (n= 252)	3.62	3.49		
	Injecting drug use	**Mean**	**SD**	**t**	**p**
$D_{3cv}MFT$	No (n = 272)	12.67	8.66	-4.28	<0.001
	Yes (n= 69)	17.74	8.82		
$D_{3cv}T$	No (n = 272)	2.66	3.31	-2.91	0.004
	Yes (n= 69)	4.14	3.89		
MT	No (n = 272)	5.75	7.71	-3.52	0.001
	Yes (n= 69)	10.04	9.35		
FT	No (n = 272)	4.26	3.82	1.39	0.17
	Yes (n= 69)	3.55	3.75		
	Drug rehabilitation	**Mean**	**SD**	**t**	**p**
$D_{3cv}MFT$	No (n = 291)	12.99	8.83	-3.85	<0.001
	Yes (n= 52)	18.02	8.64		
$D_{3cv}T$	No (n = 291)	2.69	3.28	-2.69	0.009
	Yes (n= 52)	4.33	4.17		
MT	No (n = 291)	6.15	8.02	-2.71	0.009
	Yes (n= 52)	9.88	9.36		
FT	No (n = 291)	4.16	3.87	0.66	0.51
	Yes (n= 52)	3.81	3.52		

3.7 Periodontal health: Plaque Scores

Sixty-six percent (220) of the participants examined had at least one or more of the six index teeth affected by plaque. The total mean plaque score of the participants was 0.58 (95% CI: 0.52, 0.64), the upper plaque score was 0.51 (95% CI: 0.45, 0.58) and lower was 0.61 (95% CI: 0.55, 0.68). On average the total plaque coverage for this sample was no more than one third of the total tooth surfaces examined.

Plaque scores: comparison by prison category: The grouping variable prison category significantly explained the differences in total, upper and lower mean plaque scores. The total plaque score varied significantly between adult males (0.81; 95% CI: 0.71, 0.91), females (0.61; 95% CI: 0.50, 0.77) and male young offenders (0.26; 95% CI: 0.19, 0.33) ($F_{[2, 332]}$= 20.98, p<0.001). Mean upper plaque scores varied significantly between male young offenders (0.24; 95%CI: 0.17, 0.32), females (0.51; 95%CI: 0.37, 0.65) and adult male (0.76; 95%CI: 0.65; 0.87) prisoners ($F_{[2, 313]}$ = 16.52; p<0.001). The mean lower plaque score of young offenders (0.28; 95%CI: 0.20, 0.35) was significantly different compared with female (0.73; 95%CI: 0.58, 0.88) and adult male (0.83; 95%CI: 0.73, 0.93) prisoners ($F_{[2, 331]}$=20.98; p<0.001) (Figure 3.11).

Figure 3.11: Comparison of plaque score by prison category



Plaque scores: comparison by prison experience: The mean plaque scores are presented in Table 3.36 by prison experience. No significant differences were observed in the total, upper and lower mean plaque scores by remand times, sentence times and length of current imprisonment years.

Table 3.36: Mean plaque scores: comparison by prison experience

Plaque	Remand times	Mean score(sd)	t	p
Upper	≤ 2 remands (n= 119)	0.51 (0.61)	0.03	0.98
	≥ 3 remands (n= 87)	0.51 (0.62)		
Lower	≤ 2 remands (n= 124)	0.61 (0.60)	0.42	0.68
	≥ 3 remands (n= 92)	0.58 (0.57)		
Total	≤ 2 remands (n= 124)	0.58 (0.58	0.34	0.74
	≥ 3 remands (n= 93)	0.55 (0.57)		
Plaque	**Sentence times**	**Mean score(sd)**	**t**	**P**
Upper	≤ 1 sentence (n= 136)	0.53 (0.63)	-0.05	0.96
	≥ 2 sentences (n= 113)	0.53 (0.62)		
Lower	≤ 1 sentence (n= 146)	0.58 (0.62)	-1.00	0.31
	≥ 2 sentences (n= 116)	0.66 (0.60)		
Total	≤ 1 sentence (n= 146)	0.57 (0.60)	-0.40	0.69
	≥ 2 sentences (n= 117)	0.60 (0.58)		
Plaque	**Current imprisonment (years)**	**Mean score(sd)**	**t**	**p**
Upper	≤ 4 years (n= 144)	0.52 (0.60)	0.53	0.60
	≥ 5 years (n= 136)	0.48 (0.60)		
Lower	≤ 4 years (n= 155)	0.64 (0.61)	1.26	0.21
	≥ 5 years (n= 142)	0.56 (0.60)		
Total	≤ 4 years (n= 155)	0.61 (0.60)	1.30	0.19
	≥ 5 years (n= 143)	0.52 (0.56)		

Plaque scores: comparison by oral health behaviours: Prisoners who reported that they brushed their teeth with fluoride toothpaste whilst in prison had significantly less mean total, upper and lower plaque scores compared with those who did not brush in prison (Table 3.37).

Table 3.37: Mean plaque scores: comparison by reported toothbrushing habit in prison

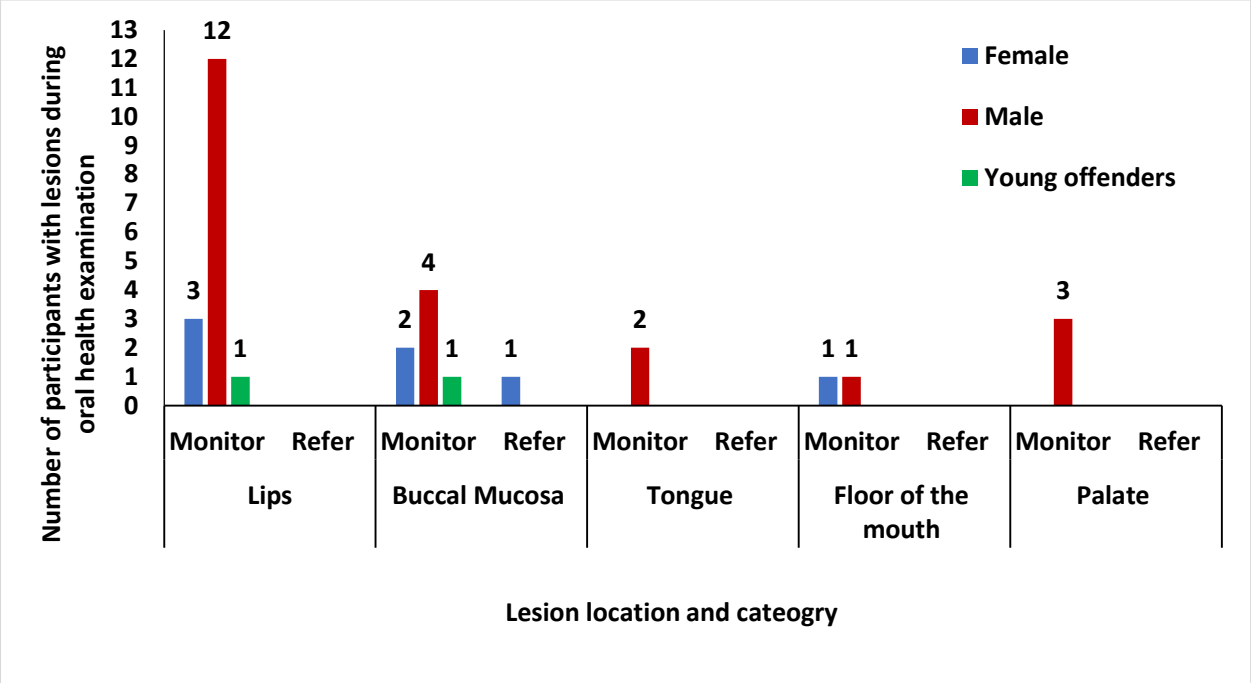
Plaque	Brushing routine at prison	Mean score (sd)	t	p
Upper	No (n= 28)	0.80 (0.74)	2.19	0.04
	Yes (n= 285)	0.49 (0.58)		
Lower	No (n= 32)	0.89 (0.71)	2.33	0.03
	Yes (n= 299)	0.59 (0.59)		
Total	No (n= 33)	0.87 (0.71)	2.52	0.02
	Yes (n= 299)	0.55 (0.56)		

3.8 Oral Mucosa

Six areas of the mouth and throat were examined for the presence of potentially malignant lesions for monitoring and referral. These were lips, buccal mucosa (cheeks), tongue, floor of the mouth (under the tongue), palate and fauces (throat).

Twenty-nine (8.3%) participants had at least one lesion that required to be monitored or referred. Lesions on lips (16), buccal mucosa (6), palate (3), tongue (2) and floor of the mouth (2) required monitoring. One lesion on buccal mucosa of a female participant required referral (Figure 3.12).

Figure 3.12: Participants with oral mucosal lesions by prison category



3.9 Functional Dentition

Participants with at least 20 standing teeth are considered to have a shortened dental arch and to have a functional dentition. Seventy-five percent (260) of participants with more than 20 teeth and the 22% (75) with a shortened dental arch were considered to have a functional dentition. Four percent (3) of participants were edentulous.

Functional dentition: comparison by prison experience

Table 3.38 shows that lower proportions of prisoners with more experience of remands, sentences and longer current prison sentence had 20 or more standing teeth (functional dentition) than those with less prison experience.

Table 3.38**:** Comparison of a functional dentition by prison experience

Prison experience	19 or fewer teeth n (%)	20 or more teeth n (%)	X^2	p
Number of prison remands				
≤ 2 remands	24 (19)	105 (81)	2.29	0.13
≥ 3remands	26 (27)	70 (73)		
Number of prison sentences				
≤ 1 sentence	33 (22)	118 (78)	1.58	0.21
≥ 2 sentences	35 (29)	88 (71)		
Current prison sentence				
≤ 4 years	23 (20)	128 (80)	3.26	0.07
≥ 5 years	44 (29)	106 (71)		

Functional dentition: comparison by age and prison category: There was a significant gradual decline in the proportion of participants with 20 or more standing teeth at the time of the examination with increasing age. Significantly greater proportions of male young offenders (97%) compared to adult males (66%) and females (59%) had 20 or more standing teeth at the time of the examination (Table 3.39).

Table 3.39: Functional dentition: comparison by age and prison category

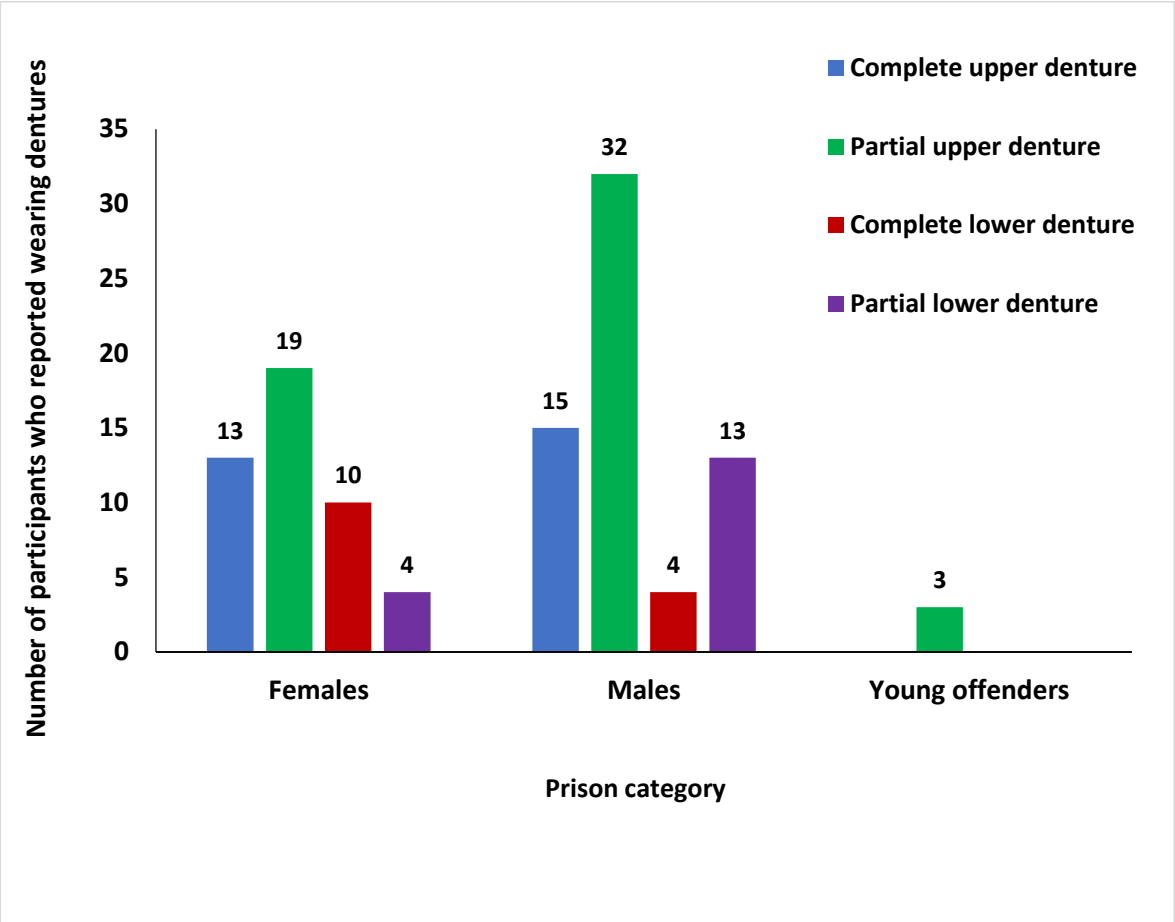
Demographic factors		20 or more standing teeth	X^2	p
Age	16-24	136 (97%)		
	25-34	63(82%)	92.21	<0.001
	35-44	32 (50%)		
	45+	29 (45%)		
Prison Category	Females	51 (59%)		
	Males	95 (66%)	49.72	<0.001
	Young offenders	114 (97%)		

3.10 Dentures

3.10.1 Reported denture provision

Eighty-seven (25%) prisoners reported that they had been provided some kind of denture at some point in their life. Of those who reported current denture use, 33% stated that they had been given a complete upper denture; 16% a complete lower denture; 63% partial upper and 20% partial lower denture (Figure 3.13)

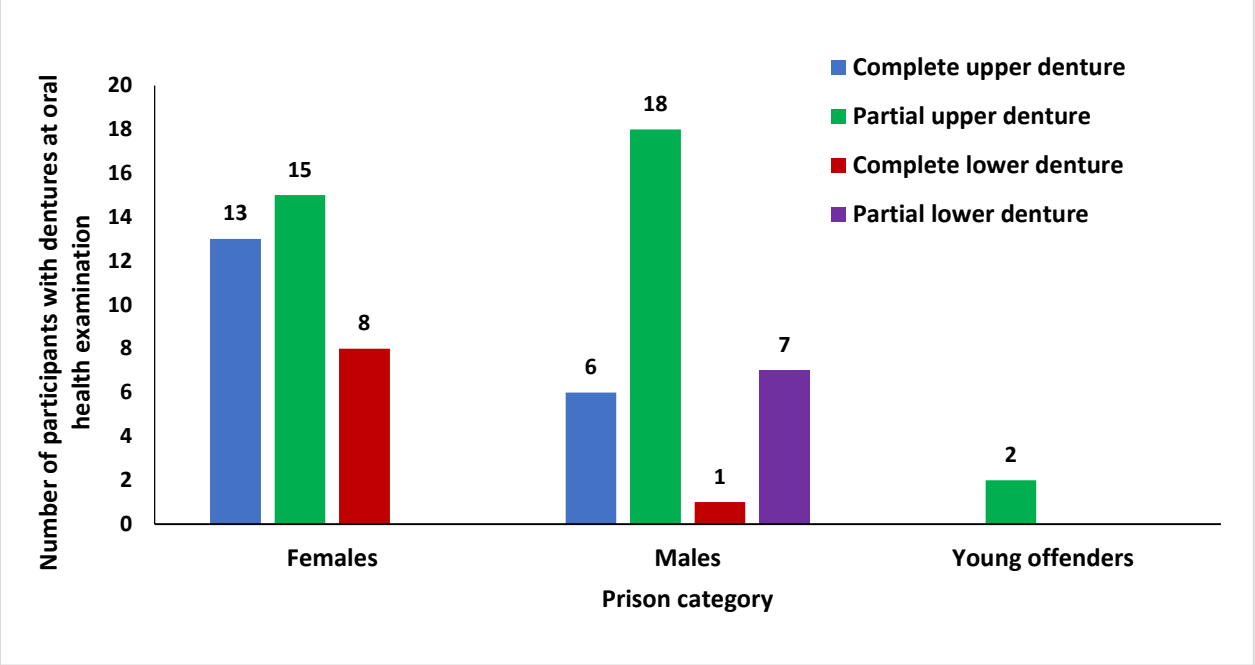
Figure 3.13: Reported denture wearing by prison establishment



3.10.2 Denture present at oral examination

Of those who participated in the oral examination, 55 (16%) participants were wearing their dentures. Of these, 19 wore upper complete dentures and nine wore lower complete dentures; 35 wore upper partial dentures and seven wore lower partial dentures. Upper denture material comprised of acrylic (92%) and metal (8%) with support obtained from tooth (4%), tissues (83%) and/or both (13%). Lower denture material also comprised of acrylic (94%) and metal (6%). Support in lower dentures was obtained from tooth (6%), tissues (81%) and both (13%). Five dentures in the upper arch needed repaired.

Figure 3.14: Dentures present at oral health examination: comparison by prison category



3.10.3 Reported denture care and hygiene

Of the 55 participants who wore their dentures at the time of oral health examination, 52 participants stated that they cleaned their dentures when inside the prison, 40 of the denture wearers stated they cleaned their dentures at home when liberated (Figure 3.15). Comparison of denture care and hygiene by prison category showed that similar numbers of prisoners cleaned their dentures inside the prison compared with outside when liberated and left their dentures out at night while in prison than outside of prison when at home (Figure 3.16).

Figure 3.15: Reported denture care and hygiene by prisoners who currently wore dentures

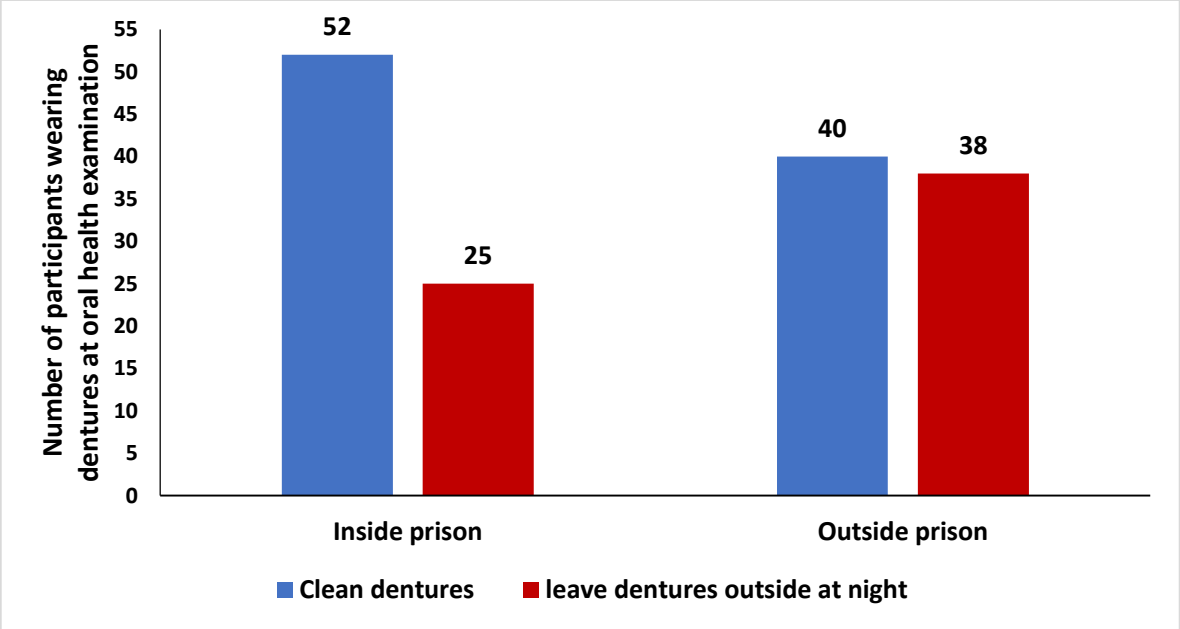
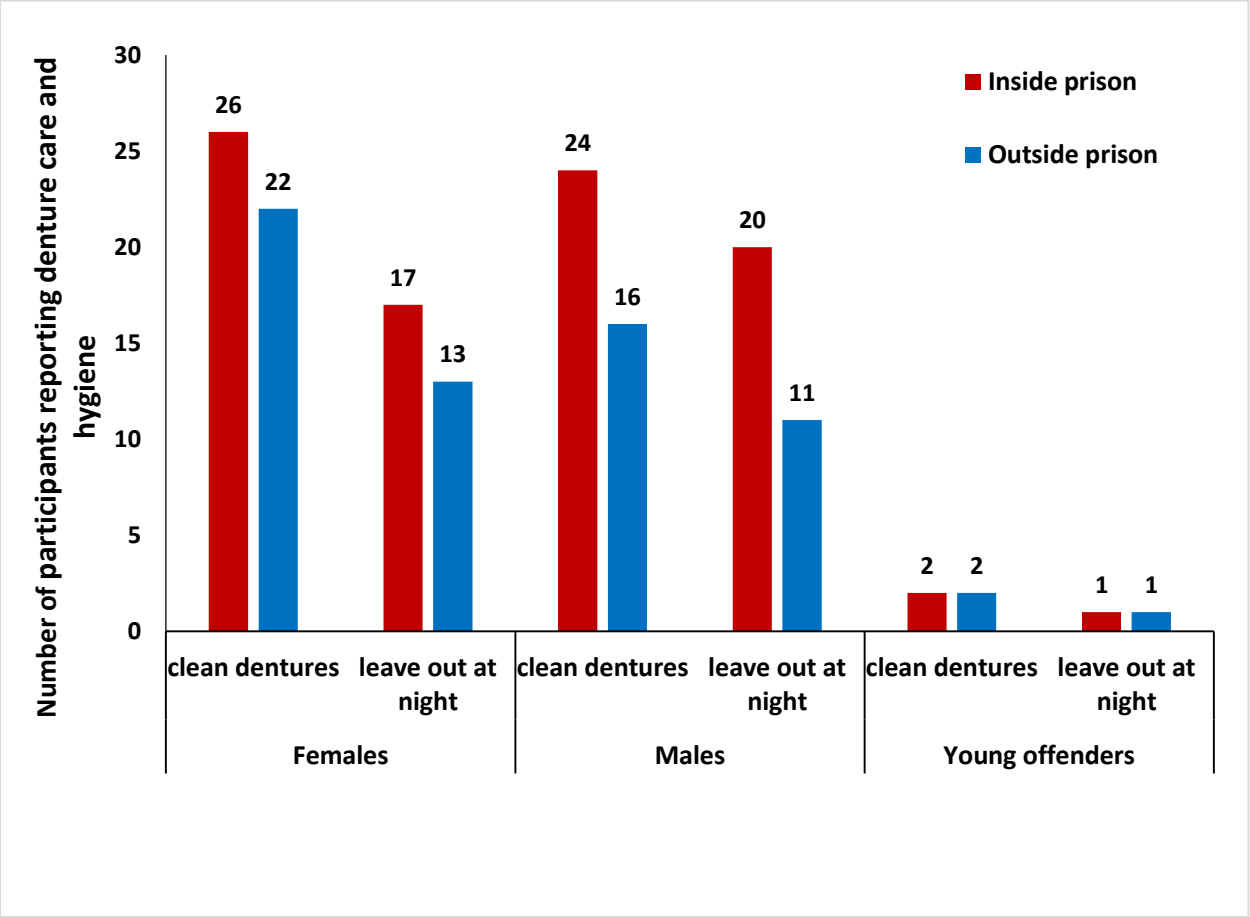


Figure 3.16: Comparison of reported denture care and hygiene by prison establishment



3.11 Synopsis of 2019 findings

The 2019 survey examined the health, psychosocial health and oral health of three groups of people in custody across 10 Scottish prisons. The aim of the survey was to use this information to provide recommendations to inform the oral health strategy to promote the oral health of those in prison.

The demographic findings of the prisoners in 2019 survey showed that they were younger (mean age 32 years), belonged to the 'white' ethnic group (94%) and were unemployed prior to imprisonment (63%) suggesting no change in their demographical profile from that reported by Graham in 2007 (Graham, 2007) and SPS Prisoner Survey 2017 (Carnie *et al.*, 2017). With regards to the prison experience some similarities in custodial sentence and length of current imprisonment were noted with the SPS Prisoner Survey 2017 (Carnie *et al.*, 2017). The majority of the prisoners in the 2019 survey reported having been on remand (74%) and sentenced (85%) between one and five times and greater proportions of prisoners (52%) stated that their current length of sentence was for four years or less.

Despite the transfer of responsibility of healthcare from1 the SPS to NHS in 2011 only 41% responders in 2019 survey stated that they had attended primary and/or secondary level medical services whereas over 70% responders in the SPS Prisoner Survey 2017 stated they attended both nurse and a doctor seeking medical care (Carnie *et al.*, 2017). The prevalence of self-reported illness such

COPD/Asthma among prisoners in 2019 survey was equivalent to that of the Scottish general population (McLean *et al.*, 2020) whereas the prevalence of hypertension and diabetes was lower than for the Scottish general population (McLean *et al.*, 2018; McLean *et al.*, 2020). The prevalence of HIV/Hepatitis C and injecting drug use was higher among female prisoners (Taylor *et al.*, 2012). Nearly 15% of the respondents stated that they had taken part in a drug rehabilitation programme and only 8% of the sample stated that they had been prescribed methadone. Although it is not possible to make a direct comparison, these figures are lower than those reported by the SPS's Prisoner Survey 2017 (Carnie *et al.*, 2017) wherein 20% of the prisoners reported being prescribed methadone of which 48% were on a maintenance programme. Forty-two percent of the sample stated that they either smoked tobacco or used electronic cigarettes. As the data for the 2019 survey were collected after the smoking ban in November 2018, therefore those who reported smoking were presumably doing so outside the prison. Interestingly, this prevalence is lower than reported by the SPS's Prisoner Survey 2017 (Carnie *et al.*, 2017) (68%) but higher than the Scottish general population (17%) (McLean *et al.*, 2018).

With regards to dental anxiety, 13% of the sample were identified as being extremely dentally anxious, equivalent to the population norm for the UK (Hill *et al.*, 2013). Female prisoners were more dentally anxious than male prisoners or male young offenders. Similarly, oral health related quality of life of women prisoners was poorer than male prisoners or male young offenders. Female prisoners had worse psychosocial health as assessed by having greater dental anxiety, poorer quality of life and increased depressive symptoms compared with male prisoners and male young offenders.

Over a third of the sample (39%) scored 16 or above on the CES-D scale and 40% of those who provided details of their medication had been prescribed anti-depressants. The mental health of prisoners was poorer than that of the general population in Scotland (McLean *et al.*, 2018). More women than adult male prisoners or male young offenders had increased depressive symptoms compared with male prisoners and male young offenders. A careful examination of the psychosocial health of people in custody would suggest a need for gender specific interventions to address the psychosocial needs of women in prison.

A change in dental health attitude was noted with the majority of the prisoners wishing to have their front and back teeth restored, together with an interest in knowing what the dentist was going to do and why.

The oral examination showed that the prisoners in this sample had increased numbers of missing teeth and fewer filled teeth, a pattern previously reported in the Scottish Prisons Dental Health Survey of 2002 (Jones *et al.*, 2004) and 2011 (Freeman *et al.*, 2013). However, the overall burden of dental disease was overwhelmingly higher than that reported in the Scottish Adult Oral Health Survey 2016-2018 (Information Services Division, 2019b). The dental decay experience was significantly higher for female prisoners, those who were on prescribed medication and those with a history of injecting drug use. When dental decay experience was explored by prison experience, those prisoners that stated that their current length of imprisonment was for five years or longer had lower mean numbers of decayed teeth, higher mean numbers of missing teeth and filled teeth than those on short term sentences of less than four years. This finding suggests that the prisoners' decayed teeth were being converted into missing and filled teeth and that they had received dental treatment inside the prison. Interestingly, the proportion of prisoners stating that they had accessed prison dental services was higher (78%) than those stating that they had ever accessed dental services either inside or outside the prison (74%). Most of the participants stated they had received dental treatments such as fillings (90%) and extractions (77%) and preventive treatments such as scale and polish (74%) at some point in their life, with minorities receiving preventive treatments such as fissure sealants and fluoride

treatment. Among dentate participants total plaque coverage for this sample covered no more than one third of the total tooth surfaces examined and those who brushed their teeth inside the prison had significantly improved oral hygiene.

It may be reasonable to suggest that the change in dental service provider affected dental attitude and it may be proposed that the prison environment with its routines provided supportive atmosphere to adopt and maintain toothbrushing behaviours and denture care hygiene practices.

4

Results

Part 2: The comparison of the 2011 and the 2019 Oral Health and Psychosocial Needs of the Scottish Prisoners and Young Offenders

4.1 Demographic profile

4.1.1 Sample

A total of 342 participants in 2011 and 353 participants in 2019 consented to participate in the survey (Table 4.1). Forty-four of the 342 participants in 2011 and five of the 353 participants in 2019 did not participate in the oral examination. Reasons for non-participation in 2011 included refusal to be examined, attendance at court, discharged/preparing for discharge from prison, at work/education, moved to another prison or agency visit. In 2019 the reasons for non-participation included refusal to be examined or at work/education.

Table 4.1: Participants in the survey and oral examination and survey only by all prison category in 2011 and 2019 surveys

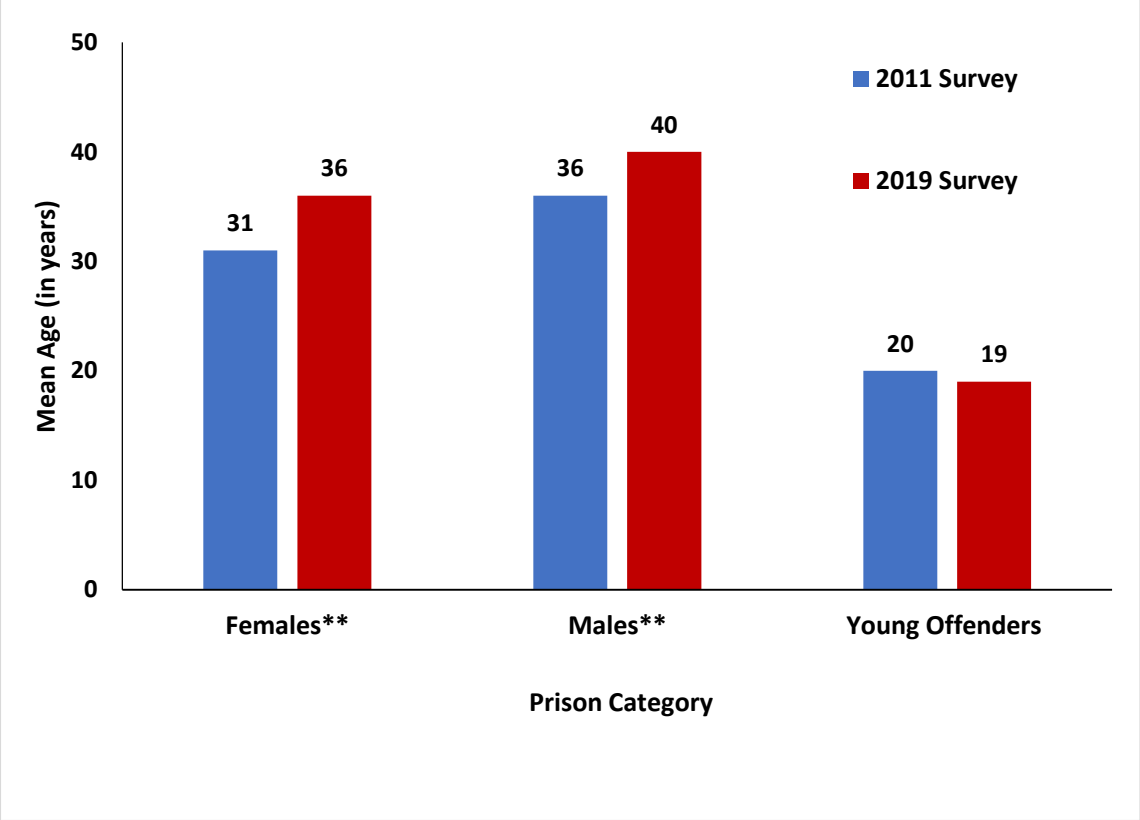
	2011 survey			2019 survey		
Prison category	**Survey and oral examination** n (%)	**Survey only** n (%)	**Total** n (%)	**Survey and oral examination** n (%)	**Survey only** n (%)	**Total** n (%)
Females	90 (26)	9 (3)	99 (29)	87 (25)	2(1)	89 (25)
Males	109 (32)	1	110 (32)	144 (41)	3 (1)	147 (42)
Young male offenders	99 (29)	34 (10)	133 (39)	117 (33)		117 (33)
Total	**298 (87)**	**44 (12)**	**342 (100)**	**348 (99)**	**5 (2)**	**353 (100)**

4.1.2 Age

Participants in the 2019 survey had a significantly higher mean age of 32.10 years (95% CI: 20.68, 33.52) compared with participants in the 2011 survey with a mean age of 28.33 years (95% CI: 27.16, 29.50) (t=4.02; p<0.001).

The grouping variables year of survey ($F_{[1,688]}$=12.96; p<0.001) and prison category ($F_{[2,688]}$=274.36; p<0.001) significantly explained differences in the mean age of participants. Therefore, female prisoners in the 2019 survey were significantly older (35.55 ± 10.11) compared with females in the 2011 survey (31.24 ± 10.78); male prisoners in 2019 were significantly older (40.27 ± 13.10) than those in the 2011 survey (36.20 ± 10.67) whereas the participating young offenders were of a similar age in the 2011 (19.56 ± 0.95) and in the 2019 survey (19.33 ± 1.23) (Figure 4.1).

Figure 4.1: Mean age of the prisoners: comparison by survey year and prison category



*p<0.05; **p<0.01; ***p<0.001

4.1.3 Marital and family status

Equivalent proportions of prisoners in the 2011 (51%) and 2019 surveys (49%) reported their marital status as single, with larger proportions in the 2019 survey (58%) reporting that they were living with a partner or were separated, widowed or divorced (57%) than in the 2011 survey ($X^2_{[2]}$=2.94; p=0.23).

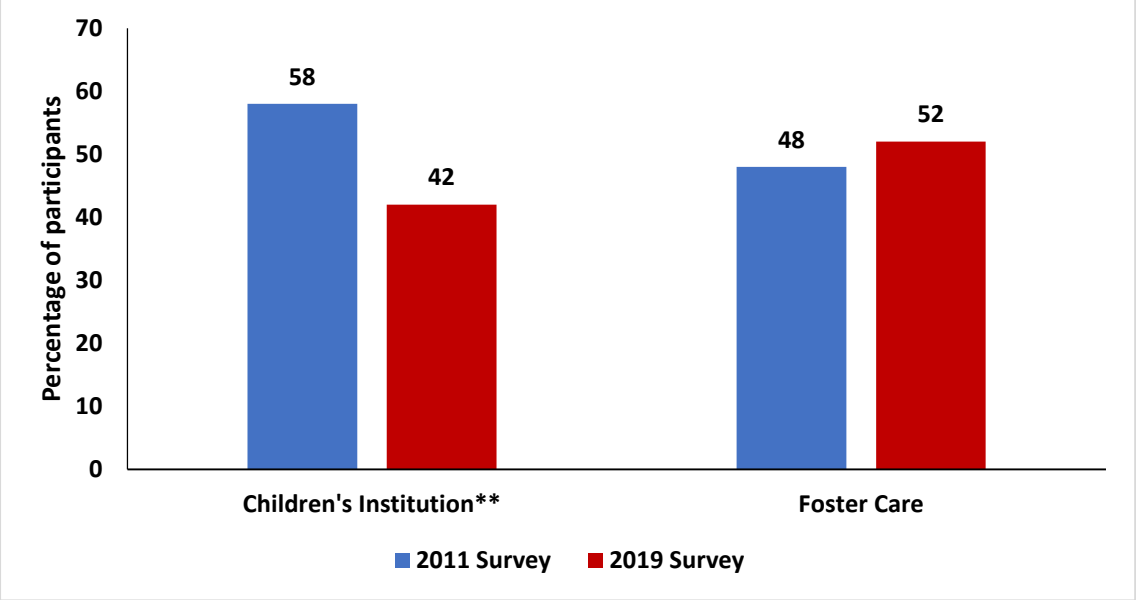
Fifty-five percent prisoners in the 2019 survey stated that they had at least one child compared to 45 percent in the 2011 survey ($X^2_{[1]}$=0.02; p=0.89). Of those prisoners with children 49% (67) in the 2011 survey and 51% (70) in the 2019 survey stated that their children lived with them prior to imprisonment ($X^2_{[1]}$=0.56; p=0.45).

4.1.4 Living arrangements

Sixty-one percent of prisoners in 2019 survey reported living in their own property compared to 40 percent of prisoners in the 2011 survey; 54% of participants in the 2011 survey stated that they living with their parents or family prior to imprisonment compared with 46% of prisoners in 2019.

Figure 4.2 shows the proportions of participants who reported their living arrangements as a child or as a teenager in the 2011 and 2019 surveys respectively. Significantly greater proportions of prisoners in 2011 (58%) than in 2019 (42%) stated that they had resided in children's institutions ($X^2_{[1]}$=10.85; p=0.001). No significant difference was noted between the proportions of participants in foster care experience between the survey years ($X^2_{[1]}$=0.05;p =0.82).

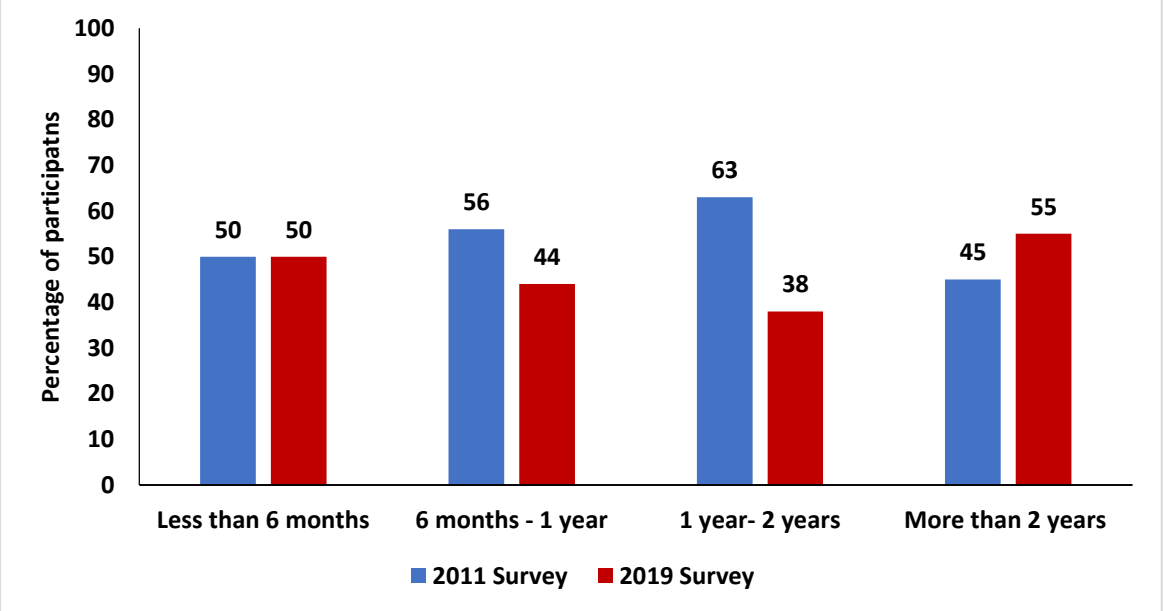
Figure 4.2: Comparison of living arrangements in childhood by survey year



*p<0.05; **p<0.01; ***p<0.001

Fifty-two percent prisoners in the 2011 and 48% of prisoners in the 2019 survey stated that they had experienced homelessness ($X^2_{[1]}$=1.00; p=0.32). The length of homelessness ranged from less than six months to more than 24 months. No significant difference was observed between the two survey years among prisoners for the length of homelessness ($X^2_{[3]}$=3.50; p=0.32) (Figure 4.3).

Figure 4.3: Comparison of reported length of time of homelessness by survey year



*p<0.05; **p<0.01; ***p<0.001

4.1.5 Employment status and education attainment

For all prisoners who participated in the two surveys 65% stated they were unemployed and only 28% reported that they had been in full-time or part-time employment. Employment status did not vary

significantly between the two survey years ($X^2_{[2]}$=1.40; p=0.50). Nearly equivalent proportions of prisoners stated they were unemployed in the 2011 (67%) and 2019 (63%) surveys and in employment in the 2011 (26%) and 2019 (30%) surveys. Only 18 participants stated they were in education/training in the 2011 and 2019 surveys.

Prisoners in the 2011 survey had left school at a mean age of 15.26 years (±1.33; range 7 to 21 years) and prisoners in 2019 survey had left school at a means age of 15.37 years (±1.32; range 8 to 20 years). The grouping variable prison category ($F_{[2,646]}$=3.83; p=0.02) significantly explained differences in the mean age when participants left school. Therefore, the mean age when young offenders left school was significantly lower (15.12; 95%CI: 14.88, 15.37) than male prisoners (15.55; 95%CI: 15.32, 15.77) but similar to female participants (15.41 [95%CI; 15.09, 15.73). The grouping variable year of survey ($F_{[1,646]}$=0.62; p=0.43) or the interaction of year of survey by prison category ($F_{[2,646]}$=0.59; p=0.55) did not explain differences in mean age when leaving school for the participants.

4.2 Prison Experience

4.2.1 Length of time in prison

The total mean length of time of imprisonment for those who participated in the 2011 and 2019 surveys was 3.05 (±5.63). The range included those in prison for the first time to those with 46 years of imprisonment in total. With regard to year of survey, participants in the 2011 survey had spent on an average 2.37 (95% CI: 1.82, 2.91) years in prison compared with participants in the 2019 survey who had spent on an average 2.90 (95% CI: 2.30, 3.48) years in prison (t= -1.30; p= 0.19).

The grouping variable prison category ($F_{[2,683]}$=34.55; p<0.001) significantly explained differences in the mean total years of imprisonment. Young offenders (0.75; 95%CI: 0.16, 1.33) had significantly lower mean number of years of imprisonment than female prisoners (2.09; 95%CI: 1.42, 2.77) who also had significantly lower mean years of imprisonment than male (4.18; 95%CI: 3.63, 4.80) prisoners. The grouping variable year of survey ($F_{[1,689]}$=0.34; p=0.56) or the interaction of year of survey by prison category ($F_{[2,689]}$=1.66; p=0.1) did not explain differences in mean number of years of imprisoned.

4.2.2 Number of prison remands and sentences

The grouping variable survey year ($F_{[1,498]}$=6.56;p=0.01) and prison category ($F_{[2,498]}$=13.38; p<0.001) significantly explained differences in the mean number of remands reported by the participants. Therefore, prisoners in the 2011 survey had a significantly greater mean number of remands (4.65; 95%CI: 3.79, 5.51) compared with prisoners in the 2019 survey (3.45; 95% CI: 2.94, 3.95). Male prisoners (5.49: 95% CI: 4.73,6.24) had a significantly higher mean number of prison remands compared with female prisoners (2.55; 95%CI: 1.66,3.48) and young offenders. (3.45; 95%CI: 2.74,4.16). The interaction of year of survey by prison category ($F_{[2,498]}$=0.63; p=0.51) did not explain differences in mean number of remands.

Prisoners in the 2011 survey had a greater mean number of sentences (3.16 [95%CI: 2.47, 3.86]) compared with prisoners in the 2019 survey (2.74 [95% CI: 2.28, 3.20]). The grouping variable prison category ($F_{[2,515]}$=14.06; p<0.001) significantly explained differences in the mean number of sentences reported by the participants. Therefore, male prisoners (4.21 [95% CI: 3.59, 4.83]) had a significantly higher mean number of sentences compared with female prisoners (1.97 [95% CI: 1.15, 2.78]) and young offenders (2.07 [95% CI: 1.40, 2.75]). The grouping variable year of survey ($F_{[1,515]}$=3.39; p=0.07) and the interaction of year of survey and prison category ($F_{[2,515]}$=2.11; p=0.12) did not explain differences in mean number of sentences.

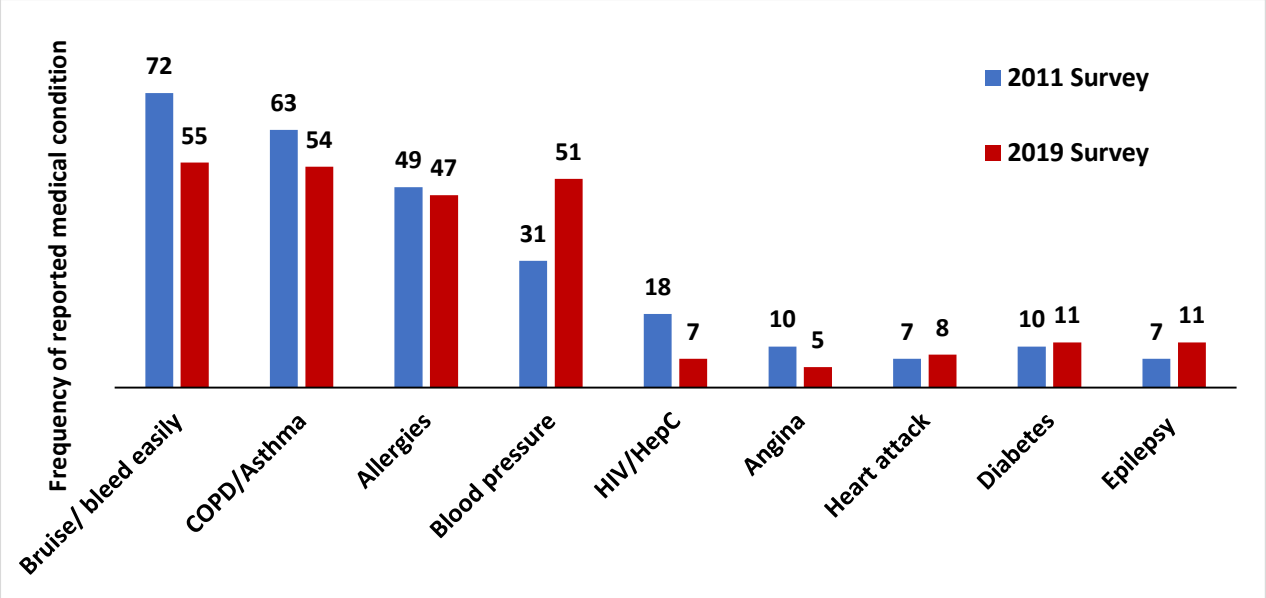
4.3 Health and health behaviours

4.3.1 Physical health

Fifty-five percent of the participants in the 2019 survey compared to 45% in the 2011 survey reported that they attended primary and/or secondary level healthcare services ($X^2_{[1]}$=2.87; p= 0.09). On examining prison category, no significant differences in the proportions of female prisoners ($X^2_{[1]}$ = 0.64; p = 0.43), male prisoners ($X^2_{[1]}$ = 1.13; p = 0.29) and young offenders ($X^2_{[1]}$ = 0.14; p = 0.71) who stated they attended the primary and/or secondary level healthcare services in either in 2011 and 2019 were demonstrated.

Equivalent proportions of prisoners in both survey years reported that they suffered from at least one of the medical condition itemised in the medical history form ($X^2_{[1]}$=0.11; p=0.74). On examining prison category, there were no significant differences in the proportions of female prisoners ($X^2_{[1]}$ = 0.01; p=0.89), male prisoners ($X^2_{[1]}$=0.19, p=0.67) and young offenders ($X^2_{[1]}$=1.90; p=0.17) who reported having at least one medical condition by the survey year (Figure 4.4).

Figure 4.4: Comparison of the frequency of reported medical conditions by survey year



4.3.2 Prescribed medications

With regard to the prescription of medication, significantly greater proportions of prisoners in the 2019 survey (56%) compared with 44% prisoners in the 2011 survey stated that they were taking prescribed medication at the time of the surveys ($X^2_{[1]}$=7.71; p=0.005). When prison category was examined by year of survey, a significantly greater proportion of male prisoners in 2019 survey (63%) compared with the 2011 survey (37%) reported being on prescribed medication ($X^2_{[1]}$=6.08; p = 0.01), however, there was no significant difference in the proportion of female prisoners ($X^2_{[1]}$=2.57; p=0.11) or young offenders ($X^2_{[1]}$=0.00; p=0.99) who stated being on prescribed medication in the 2001 or 2019 surveys.

Table 4.2 shows the details of prescribed medication provided by 134 participants in the 2011 survey and 167 participants in the 2019 survey. The largest proportion of reported and named medications in both 2011 and 2019 were within psychotropic medicine group accounting for 61 percent of all reported prescribed medications. These included for depression (33%), anxiety-related disorders

(18%) and psychosis (9%). When examined by year of survey, there were significantly lower reported and named medications for depression in 2011 (46%) than in 2019 (58%) ($X^2_{[1]}$=4.10; p=0.04) and similarly for anxiolytics 22% in 2011 and 27% in 2019 (27%) ($X^2_{[1]}$=4.58; p=0.03). No other significant differences were shown for anti-psychotic medication or methadone.

Table 4.2: Comparison of the frequency of reported medications by survey year

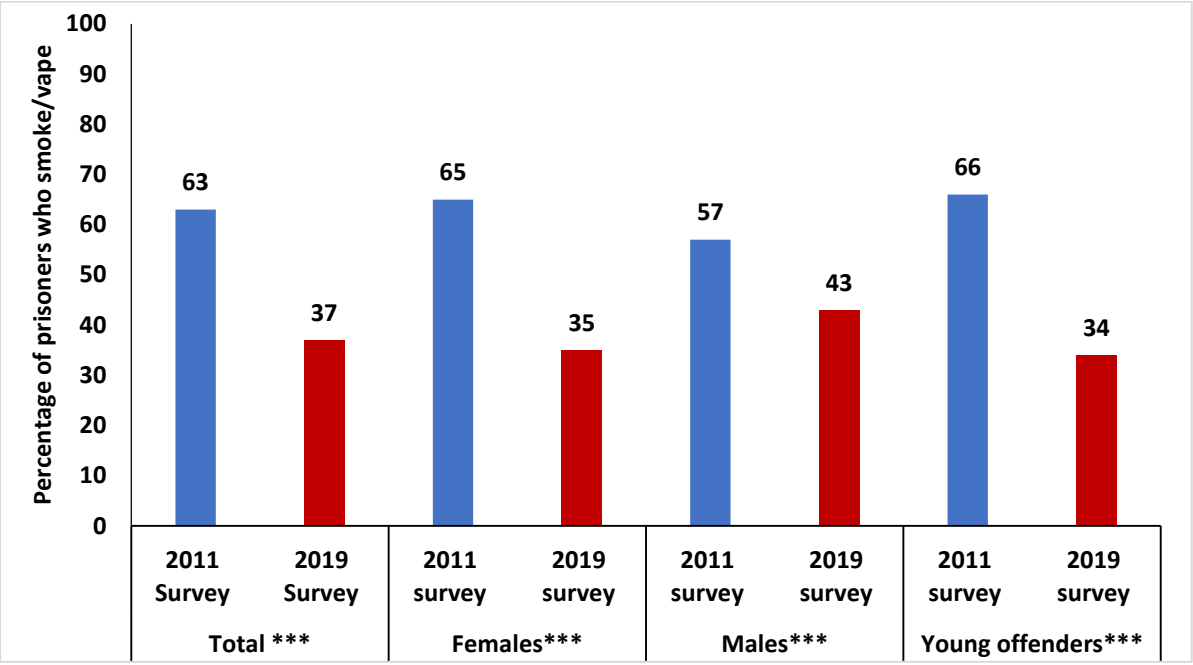
	2011 survey (n)	**2019 survey (n)**
No medication	165	137
Medication	154	198
Medication details provided	**134**	**167**
Anti-depressants	**38**	**66**
Analgesics	30	52
Cardiovascular medication	11	29
Methadone	25	27
Anti-epileptics	11	27
Gastro-intestinal medication	17	22
COPD/Asthma medication	22	19
Anti-psychotics	**9**	**19**
Anxiolytics	**15**	**34**
Metabolic diseases	6	7
Skin cream	9	6
ADHD medication	1	5
Antibiotics	13	4
Lipid regulating drugs	8	4
Vitamin supplements	6	4
Other medication	4	4
Anti-Viral medications	2	3
Antihistamines	2	3
Anti-fungal medication	3	-

4.3.3 Smoking behaviours

Significantly larger proportions of prisoners in the 2011 survey (63%) compared with 2019 survey (37%) stated that they smoked cigarettes or vaped[4] ($X^2_{[1]}$=78.0;p<0.001). On examining prison category individually, statistically significant differences were observed across survey years and smoking/vaping status. Greater proportions of female prisoners in the 2011 survey (65%) compared with female prisoners in 2019 survey (35%) smoked/vaped ($X^2_{[1]}$=18.99; p=<0.001) and greater proportions of male prisoners in the 2011 survey (57%) compared with male prisoners in 2019 survey (43%) smoked/vaped ($X^2_{[1]}$=24.99; p<0.001). Greater proportions of young offenders in the 2011 survey (66%) compared with young offenders in 2019 survey (34%) smoked/vaped ($X^2_{[1]}$=30.99; p<0.001) (Figure 4.5).

[4] The 2019 data were collected after the smoking ban in Scottish prisons was introduced in November 2018. Although there was a significant difference in the survey years for smoking/vaping status it should be noted that those who reported smoking in 2019 survey, it was assumed they reported their smoking behaviours outside of the prison.

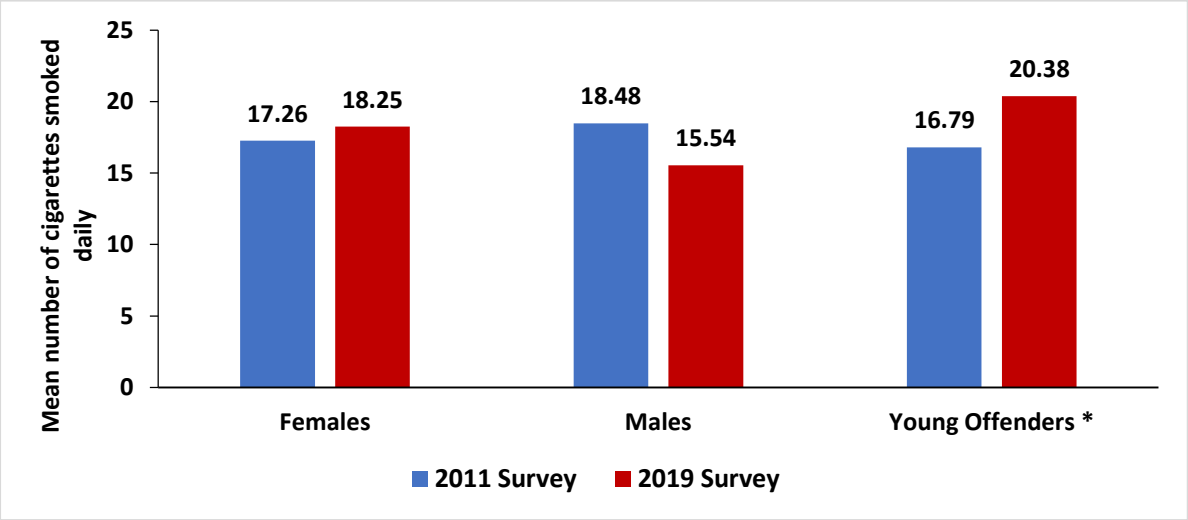
Figure 4.5: Comparison of prisoner smoking behaviours by survey year and prison category



*p<0.05; **p<0.01; ***p<0.001

The mean number of cigarettes reportedly smoked daily in the 2011 survey was 17.41 (median: 15; range: 2 to 50) (95% CI: 16.32, 18.50) and the 2019 survey was 18.21 (median: 20; range: 1 to 55) (95% CI: 16.38, 20.04). No significant difference was observed in the mean number of cigarettes reportedly smoked per day by survey year (t=0.74; p= 0.46). The mean number of cigarettes smoked daily were further examined by prison category individually. Young offenders in the 2019 survey smoked significantly greater mean numbers of cigarettes daily (20.38) compared with young offenders in the 2011 survey (16.79) (t=2.00; p<0.05). No significant differences were shown in the mean number of cigarettes reportedly smoked daily between female prisoners (t=0.48; p=0.63) and male prisoners (t=1.73; p=0.09) by survey year (Figure 4.6).

Figure 4.6: Comparison of mean numbers of cigarettes daily smoked by survey year and prison category



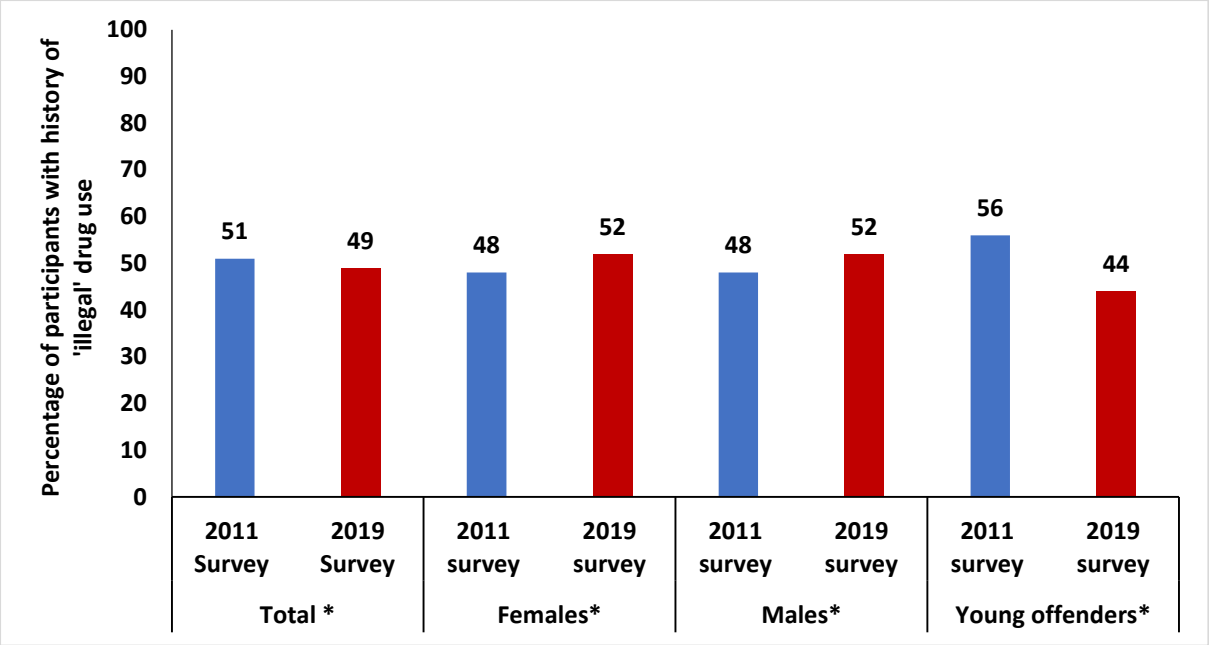
p<0.05; **p<0.01; ***p<0.001

4.3.4 Drug taking behaviours

History of drug use

Two hundred and sixty-eight prisoners in the 2011 survey and 255 prisoners in 2019 survey stated that they had used *'illegal drugs'*. Significantly greater proportions of prisoners in the 2011 survey (51%) compared with prisoners in 2019 survey (49%) stated they had used '*illegal drugs*' ($X^2_{[1]}$=4.91; p=0.04). For prison category, statistically significant differences were observed across survey years for drug use. A larger proportions of female prisoners in the 2019 survey (52%) compared with those in the 2011 survey (48%) stated that they had a history of drug use ($X^2_{[1]}$=4.43; p=0.04). Similarly, greater proportions of male prisoners who participated in the 2019 survey (52%) than those in the 2011 survey also stated they had used illegal drugs (48%) ($X^2_{[1]}$=6.59; p=0.01), whereas, lower proportions of young offenders who had participated in the 2019 survey (44%) than in 2011 survey (56%) reported to have used illegal drugs ($X^2_{[1]}$=6.30; p=0.01) (Figure 4.7).

Figure 4.7: Comparison of prisoners' history of drug use by survey year and prison category

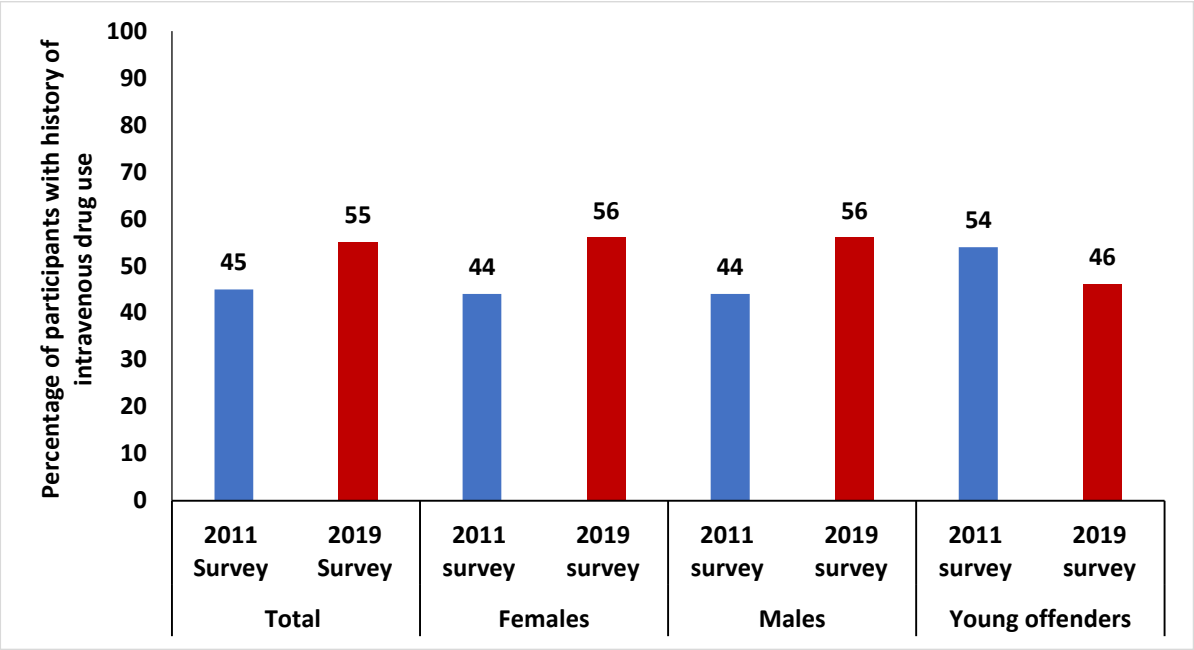


*p<0.05; **p<0.01; ***p<0.001

History of injecting drug use:

Fifty-eight prisoners in the 2011 survey (45%) and 71 prisoners in the 2019 survey (55%) stated that they had used intravenous drugs ($X^2_{[1]}$=0.44; p=0.51). In addition, there were no significant differences in the proportion of female prisoners ($X^2_{[1]}$=2.33; p=0.13), male prisoners ($X^2_{[1]}$=0.08; p=0.77) and young offenders ($X^2_{[1]}$=0.04; p=0.84) who stated they had used intravenous drugs by survey year (Figure 4.8).

Figure 4.8: Comparison of prisoners' history of injecting drug use: comparison by survey year and prison category



Drug rehabilitation programme experience:

Sixty-three prisoners in the 2011 survey (54%) and 53 prisoners in the 2019 survey (46%) stated that they had taken part in a drug rehabilitation programme. There were no significant differences between the two survey years and drug rehabilitation experience ($X^2_{[1]}$=1.26; p=0.26). Furthermore, there was no significant difference in the proportions of female prisoners ($X^2_{[1]}$=0.0; p=0.97), male prisoners ($X^2_{[1]}$=2.39; p=0.12) and young offenders ($X^2_{[1]}$=0.52; p=0.47) who stated that they had participated in a drug rehabilitation programme by survey year.

4.4 Psychosocial health and dental health-related attitudes

4.4.1 Dental Anxiety

The mean Modified Dental Anxiety Scale (MDAS) score for prisoners in the 2011 survey was 10.27 (95% CI: 9.64, 10.90) and in the 2019 survey was 10.87 (95% CI: 10.28, 11.46) (t=1.37; p=0.17). Table 4.3 presents the mean MDAS scores by survey year and prison category. There were no significant differences in mean MDAS scores of the participants by year of survey $F_{[1,672]}$=2.50, p=0.11 or by the interaction of survey year with prison category (Table 3). Women, however, had significantly greater mean MDAS scores compared with the male prisoners and young offenders ($F_{[2,672]}$=13.75, p<0.001) in both survey years.

The MDAS cut-off for dental phobia is a score of 19 or over. Thirteen percent (87) of the total 2011 and 2019 samples who completed the MDAS scored 19 and over and were considered to be dentally phobic. Therefore, 42 participants in the 2011 and 45 in the 2019 survey scored 19 or over and were characterised as dentally phobic. Therefore equivalent proportions of participants in both survey years could be classified as dentally phobic ($X^2_{[6]}$=6.73; p=0.35).

Table 4.3:Comparisons of mean MDAS scores by survey year and prison category

Survey year	Prison category	Mean (sd)	F(df)	p
2011	Female (n=91)	12.07 (6.69)	0.43 (2,672)	0.65
	Male (n=105)	9.15 (4.89)		
	Young Offender (n=132)	9.92 (5.49)		
2019	Female (n=88)	12.77 (6.20)		
	Male (n=146)	10.30 (5.21)		
	Young Offender (n=116)	10.14 (5.27)		

Individual MDAS items are presented in Figure 4.9 by survey year. The mean scores of the individual MDAS items were examined by survey year and prison category in Table 4. Table 4.4 shows details of mean dental anxiety scores for individual MDAS items and its comparison by prison category and survey year, with significant differences highlighted in bold. Male prisoners in the 2019 survey had a significantly higher mean dental anxiety score compared with male prisoners in the 2011 survey for the MDAS two items teeth drilled and scale and polish. No other significant differences were observed.

Figure 4.9: Percentage of prisoners who reported dental anxiety (MDAS items) by survey year

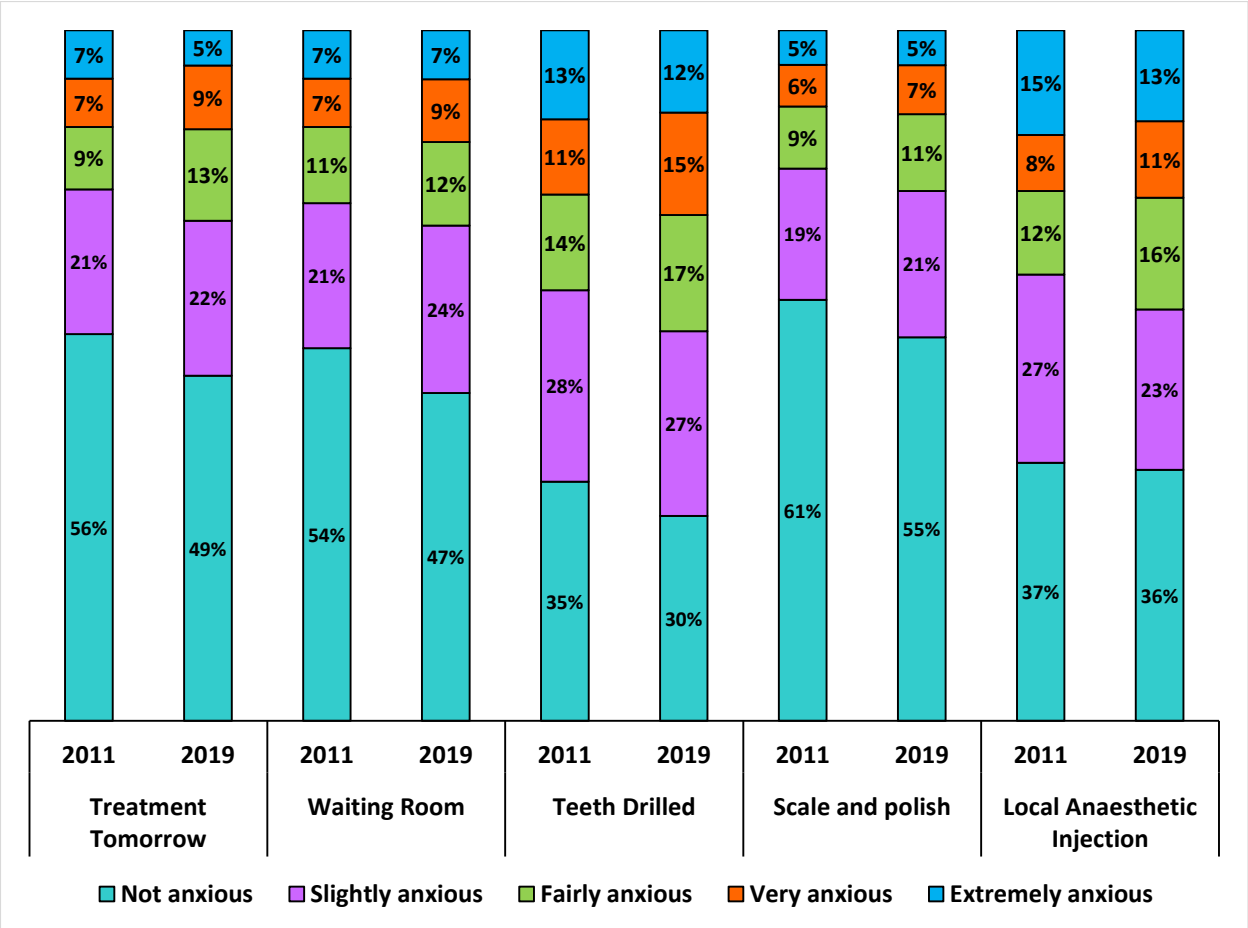


Table 4.4: Comparisons of mean MDAS item scores by survey year and prison category

MDAS item	Prison category	2011 Survey mean	2019 Survey mean	t	p
Treatment Tomorrow	Females	2.26	2.36	0.48	0.63
	Males	1.67	1.92	1.86	0.06
	Young offenders	1.77	1.79	0.12	0.90
Waiting Room	Females	2.31	2.51	0.94	0.35
	Males	1.71	1.97	1.78	0.08
	Young offenders	1.82	1.86	0.29	0.77
Teeth Drilled	Females	2.83	2.86	0.16	0.88
	Males	**2.08**§	**2.41**	**2.06**	**0.04**
	Young offenders	2.38	2.43	0.32	0.75
Scale and polish	Females	2.14	2.25	0.53	0.60
	Males	**1.50**	**1.75**	**2.03**	**0.04**
	Young offenders	1.65	1.72	0.45	0.65
Local anaesthetic agent	Females	2.69	2.78	0.41	0.68
	Males	2.17	2.25	0.48	0.63
	Young offenders	2.29	2.34	0.24	0.81

§: Statistically significant differences presented in bold

4.4.2 Oral Health Related Quality of Life (OHIP-14)

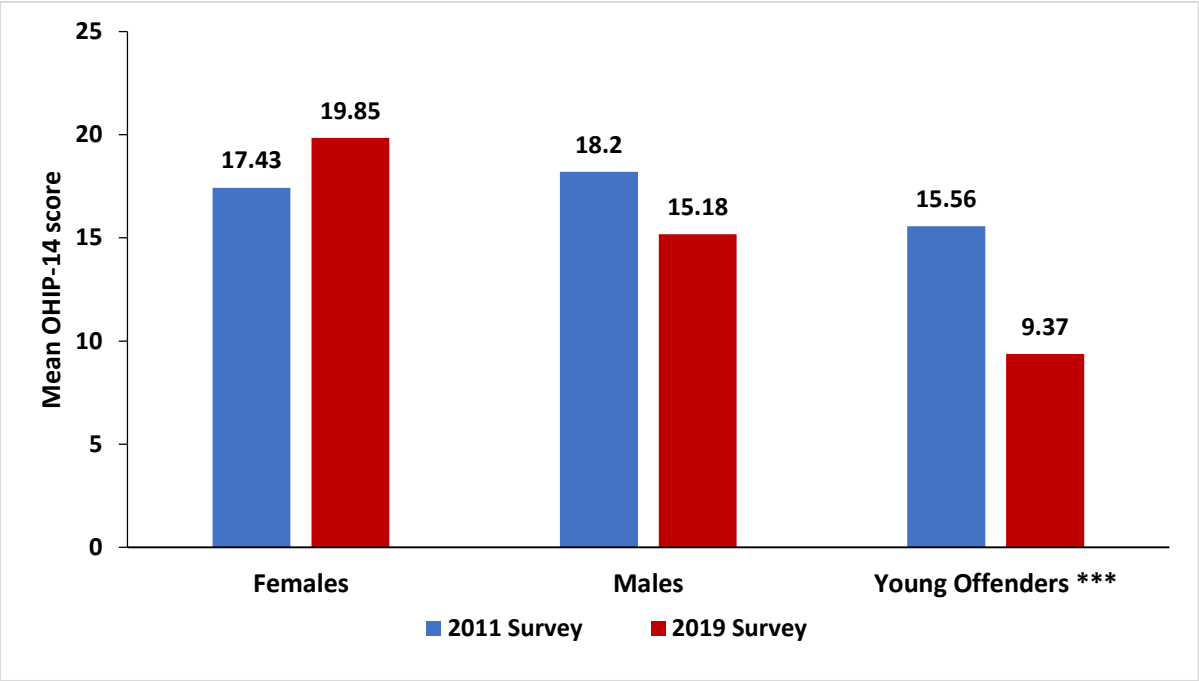
The mean OHIP-14 for oral health-related quality of life (OHRQoL) total score for participants in the 2011 survey was 14.94 (95% CI: 15.33, 18.56) and for participants in the 2019 survey was 14.42 (95% CI: 13.10, 15.73). The grouping variables survey year ($F_{[1,664]}$=4.57;p=0.03), prison category ($F_{[2,664]}$=12.24;p<0.001) and the interaction of survey year with prison category ($F_{[2,664]}$=5.31;p=0.005) significantly explained differences in the total mean OHIP-14 scores. Young offenders, therefore, in 2019 not only had lower mean total OHIP-14 scores than in 2011 but also had significantly lower mean scores than male and female prisoners (Figure 4.10). There was a fall in mean total OHIP-14 scores for male prisoners but an increase in oral health impacts for women prisoners between 2011 and 2019.

Table 4.5 shows details of the proportions of participants reporting the frequency of oral health impacts within the OHRQoL domains by survey year with significant differences highlighted in bold. Significantly lower proportions of prisoners in the 2019 survey compared with prisoners in the 2011 survey reported having occasional, fairly often and very often the following problems: painful aching mouth, having to interrupt meals, difficulty in doing usual jobs, life less satisfying and unable to function. Twenty percent of participants in 2019 compared with 28% in 2011 felt embarrassed very often on account of their teeth, mouth or dentures and a significant fall in the proportions of prisoners who felt irritable with others very often from participants in 2011 (11%) to those in 2019 (4%).

The mean scores of individual OHIP-14 items examined by survey year and prison category are presented in Table 4.6. Young offenders in the 2011 survey had significantly higher mean OHIP-14 item scores and so greater impacts on their OHRQoL than young offenders in the 2019 survey for the following 12 OHIP-14 items; sense of taste, painful aching mouth, uncomfortable to eat foods, self-conscious, feeling tense, interrupt meals, difficulty to relax, embarrassed, irritable with other people, difficulty in doing usual jobs, life less satisfying and unable to function. Male prisoners in the 2011

than in the 2019 survey had a significantly higher mean scores for the items; interrupt meals, irritable with other people, difficulty in doing usual jobs and unable to function. No other significant differences in mean OHIP-14 item scores.

Figure 4.10: Comparisons of mean total OHIP-14 scores by survey year and prison category



*p<0.05; **p<0.01; ***p<0.001

Table 4.5: Comparison of the proportions of participants reporting oral health impacts by survey year

	Occasionally		Fairly Often		Very Often		X^2	p
	2011 Survey	2019 Survey	2011 Survey	2019 Survey	2011 Survey	2019 Survey		
Functional Limitation								
Pronouncing words	11%	10%	4%	4%	5%	3%	3.01	0.56
Sense of taste worsened	17%	18%	6%	3%	5%	5%	2.98	0.56
Physical Pain								
Painful aching mouth	**36%**§	**33%**	**9%**	**8%**	**13%**	**7%**	**11.4**	**0.02**
Uncomfortable eating	24%	26%	12%	10%	16%	11%	6.33	0.18
Psychological Discomfort								
Felt self-conscious	18%	24%	11%	15%	27%	23%	8.46	0.08
Felt tense	23%	21%	11%	11%	17%	12%	4.74	0.32
Physical Disability								
Had an unsatisfactory diet	13%	13%	6%	5%	7%	6%	1.32	0.86
Had to interrupt meals	**20%**	**17%**	**8%**	**6%**	**9%**	**4%**	**9.68**	**<0.05**
Psychological Disability								
Difficult to relax	25%	22%	8%	6%	11%	7%	6.91	0.14
Felt embarrassed	**15%**	**25%**	**11%**	**12%**	**28%**	**20%**	**14.95**	**0.005**
Social Disability								
Irritable with other people	**19%**	**20%**	**7%**	**5%**	**11%**	**4%**	**17.02**	**0.002**
Difficulty in doing usual jobs	**11%**	**10%**	**4%**	**2%**	**5%**	**1%**	**10.02**	**0.04**
Handicap								
Life less satisfying	**16%**	**15%**	**8%**	**6%**	**11%**	**5%**	**11.31**	**0.02**
Unable to function	**14%**	**9%**	**5%**	**2%**	**5%**	**1%**	**17.38**	**0.002**

§: Statistically significant differences presented in bold

Table 4.6: Comparison of mean OHIP-14 items scores by survey year and prison category

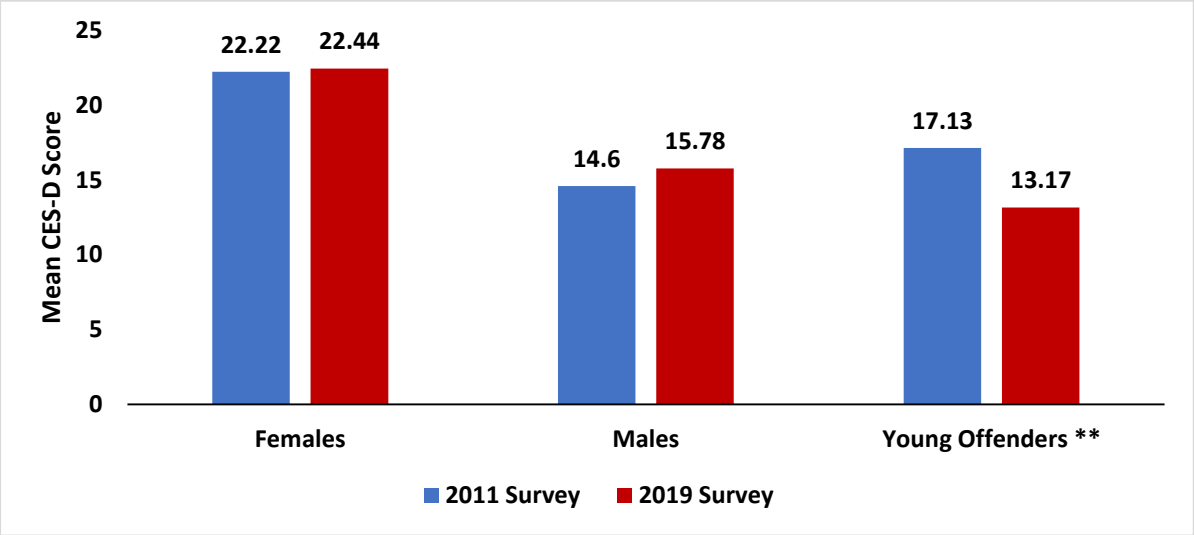
OHIP-14 items	Prison Category	2011 Survey mean	2019 Survey mean	t	p
Pronouncing words	Female	0.62	0.59	0.15	0.88
	Male	0.65	0.63	0.15	0.88
	Young Offenders	0.65	0.45	1.47	0.14
Sense of taste	Female	0.98	1.25	1.42	0.16
	Male	0.84	0.66	1.28	0.20
	Young Offenders	**0.78§**	**0.50**	**2.09**	**0.04**
Painful aching in mouth	Female	1.67	1.67	0.07	0.99
	Male	1.57	1.46	0.69	0.49
	Young Offenders	**1.77**	**1.21**	**3.91**	**<0.001**
Uncomfortable to eat foods	Female	1.66	1.61	0.20	0.84
	Male	1.61	1.61	0.03	0.98
	Young Offenders	**1.57**	**0.97**	**3.68**	**<0.001**
Self-conscious	Female	2.03	2.47	1.92	0.06
	Male	2.09	2.13	0.19	0.85
	Young Offenders	**1.64**	**1.24**	**2.11**	**0.04**
Tense	Female	1.62	1.95	1.51	0.13
	Male	1.73	1.49	1.26	0.21
	Young Offenders	**1.48**	**0.78**	**4.33**	**<0.001**
Unsatisfactory diet	Female	1.09	1.22	0.61	0.54
	Male	1.06	0.78	1.72	0.09
	Young Offenders	0.53	0.40	1.19	0.24
Interrupt meals	Female	1.22	1.25	0.12	0.91
	Male	**1.20**	**0.87**	**2.02**	**0.04**
	Young Offenders	**0.96**	**0.49**	**3.53**	**<0.001**
Difficult to relax	Female	1.32	1.43	0.53	0.59
	Male	1.47	1.16	1.75	0.08
	Young Offenders	**1.22**	**0.68**	**3.74**	**<0.001**
Embarrassed	Female	1.98	2.25	1.17	0.24
	Male	1.90	1.99	0.47	0.64
	Young Offenders	**1.67**	**1.04**	**3.28**	**0.001**
Irritable with people	Female	1.26	1.36	0.52	0.61
	Male	**1.16**	**0.82**	**2.06**	**0.04**
	Young Offenders	**1.15**	**0.45**	**5.08**	**<0.001**
Difficulty in doing usual jobs	Female	0.83	0.81	0.15	0.88
	Male	**0.73**	**0.48**	**2.07**	**0.04**
	Young Offenders	**0.61**	**0.30**	**2.78**	**0.006**
Life less satisfying	Female	1.40	1.20	0.95	0.34
	Male	1.15	0.92	1.35	0.18
	Young Offenders	**1.01**	**0.53**	**3.36**	**<0.001**
Unable to function	Female	0.94	0.74	2.00	0.23
	Male	**0.76**	**0.37**	**3.03**	**0.003**
	Young Offenders	**0.61**	**0.32**	**2.55**	**0.01**

§: Statistically significant differences presented in bold

4.4.3 Depression

The total mean CES-D score to assess depression, for prisoners in the 2011 survey was 17.69 (95% CI: 16.28, 19.10) and that for prisoners in the 2019 survey was 16.51 (95% CI: 15.17, 17.85) (t=1.20; p=0.23). The grouping variable prison category ($F_{[2,608]}$=20.95, p<0.001) and the interaction of survey year with prison category ($F_{[2,608]}$=2.99, p=0.050) significantly explained differences in mean CES-D scores. Women had significantly greater mean scores for CES-D than male prisoners and young offenders in 2019 than in 2011 while young offenders had significantly lower mean CES-D scores in 2019 than in 2011 (Figure 4.11).

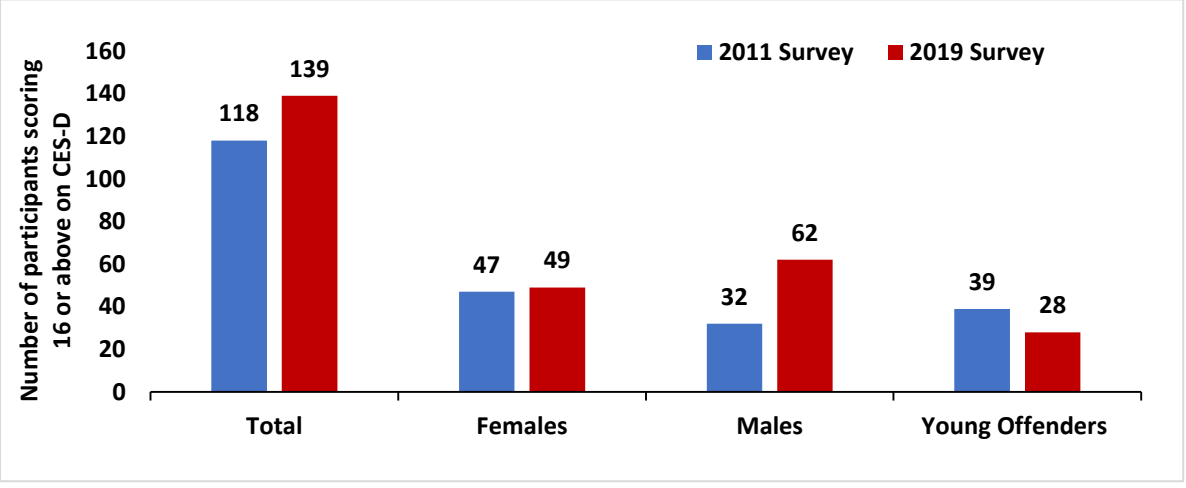
Figure 4.11 Comparison of mean total CES-D scores by survey year and prison category



*p<0.05; **p<0.01; ***p<0.001

Interestingly, greater proportions of prisoners in the 2019 survey (54%) compared with prisoners in the 2011 survey (46%) scored 16 or above on the CES-D scale, suggesting that they were suffering from a depressive illness. Greater numbers of female and male prisoners in the 2019 survey scored above the cut-off for depression compared with female and male prisoners in the 2011 survey respectively. A fall in the number of young offenders scoring 16 and above on the CES-D was noted in the 2019 compared with the 2011 survey (Figure 4.12).

Figure 4.12: Comparison of prisoners scoring 16 or above on CES-D by survey year and prison category



*p<0.05; **p<0.01; ***p<0.001

4.4.4 Oral health-related attitudes: dental treatment

The scores for the seven oral health-related attitudes to dental treatment were summed to form an attitudinal scale, with a Cronbach alpha on 0.77. The total mean score for oral health-related attitudes to dental treatment for the entire 2011 and 2019 sample was 14.62 (5.18) ranging from seven to 28, with lower scores denoting more positive attitudes. The grouping variables year of survey ($F_{[1,651]}$= 4.89; p=0.03) and prison category ($F_{[2,651]}$= 6.38; p=0.002) significantly explained differences in mean oral health-related attitudes to dental treatment. Therefore, women participants had significantly lower mean scores for oral health-related attitudes in 2011 compared with 2019 and had significantly lower mean scores for oral health-related attitudes compared with male prisoners and young offenders in both survey years.

The mean scores of each oral health-related attitude item were compared by year of study (Table 4.7). Attitude 4 'I'd like to know more about what the dentist is going to do and why' had the highest mean score in both survey years. Prisoners in the 2011 than the 2019 survey had a higher mean score for Attitude 3 'Going to the dentist is like being processed on a conveyor belt' and Attitude 7 'I find NHS dental treatment difficult to find outside of prison'. No other significant differences were observed.

Table 4.7: Oral health-related attitudinal items to dental treatment: comparison by survey year

Oral health-related attitudinal items		2011 Survey Mean (sd)	2019 Survey Mean (sd)	t	p
Attitude 1	If I had toothache I'd rather take painkillers than go to the dentist	2.36 (1.22)	2.20 (1.22)	1.67	0.09
Attitude 2	The worst part of going to the dentist is waiting	2.40 (1.22)	2.32 (1.82)	0.94	0.34
Attitude 3	**Going to the dentist is like being processed on a conveyor belt**	**1.99 (1.23)**§	**1.70 (0.85)**	**3.55**	**<0.001**
Attitude 4	I'd like to know more what the dentist is going to do and why	2.72 (1.21)	2.57 (1.19)	1.60	0.11
Attitude 5	I don't like fancy (intricate) dental treatment	2.02 (1.08)	1.89(1.05)	1.63	0.10
Attitude 6	I don't like lying flat in the dental chair	1.73 (1.06)	1.66	0.90	0.37
Attitude 7	**I find NHS dental treatment difficult to find outside of prison**	**2.08 (1.18)**	**1.85 (1.07)**	**2.67**	**0.008**

§: Statistically significant differences presented in bold

The mean scores for each oral health-related attitude item were compared by year of study and by prison category (Table 4.8). Male prisoners had significantly greater mean scores for three of the oral health-related attitude items; Attitude 3: Going to the dentist is like being processed on a conveyor belt, [2] Attitude 5: I don't like fancy (intricate) dental treatment and [3] Attitude 6: I don't like lying flat in the dental chair in 2011 than in the 2019 survey. No other significant differences were observed. This suggested that with regard to the provision of dental treatment changes in attitude were noted between the two survey years.

Table 4.8: Oral health-related attitudinal items to dental treatment: comparison by survey year and prison category

Oral health-related attitudinal items	Prison Category	2011 Survey Mean	2019 Survey Mean	t	p
Attitude 1: If I had toothache I'd rather take painkillers than go to the dentist	Female	2.65	2.47	0.99	0.32
	Male	1.92	1.88	0.23	0.82
	Young Offenders	2.50	2.40	0.66	0.51
Attitude 2: The worst part of going to the dentist is waiting	Female	2.47	2.24	1.38	0.17
	Male	2.51	2.47	0.30	0.76
	Young Offenders	2.26	2.19	0.49	0.63
Attitude 3: Going to the dentist is like being processed on a conveyor belt	Female	2.05	1.83	1.36	0.18
	Male	**2.05**§	**1.63**	**3.06**	**0.003**
	Young Offenders	1.89	1.71	1.49	0.14
Attitude 4: I'd like to know more what the dentist is going to do and why	Female	2.89	2.85	0.21	0.83
	Male	2.71	2.55	1.05	0.30
	Young Offenders	2.60	2.40	1.37	0.17
Attitude 5: I don't like fancy (intricate) dental treatment	Female	2.24	2.02	1.30	0.19
	Male	**2.06**	**1.80**	**1.96**	**0.05**
	Young Offenders	1.83	1.91	-0.59	0.56
Attitude 6: I don't like lying flat in the dental chair	Female	1.96	1.91	0.30	0.77
	Male	**1.77**	**1.48**	**2.22**	**0.03**
	Young Offenders	1.53	1.70	-1.28	0.20
Attitude 7: I find NHS dental treatment difficult to find outside of prison	Female	2.31	2.07	1.31	0.19
	Male	**2.11**	**1.83**	**1.94**	**0.05**
	Young Offenders	1.89	1.70	1.44	0.15

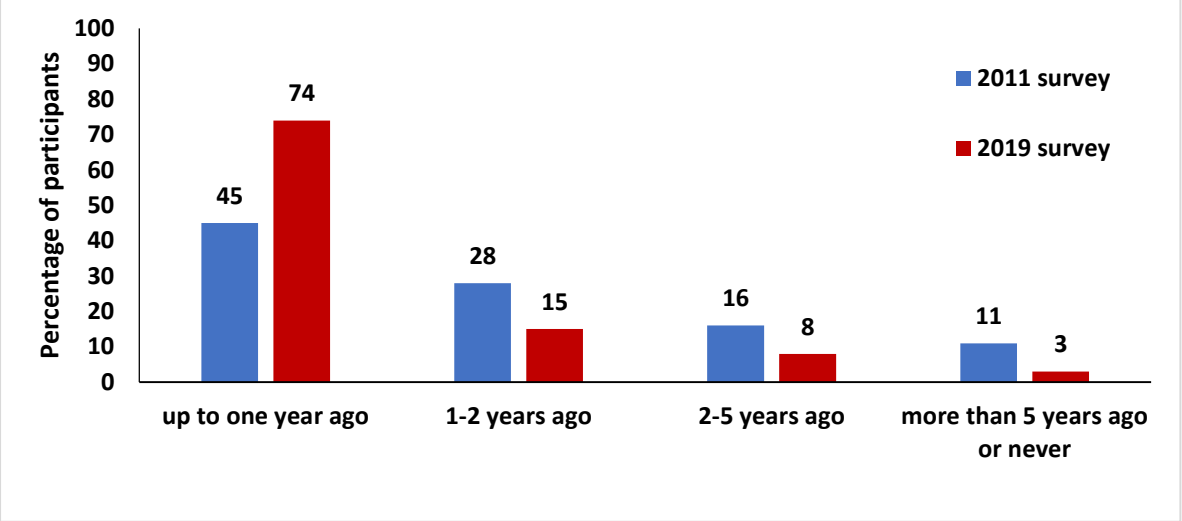
§: Statistically significant differences presented in bold

4.5 Dental health behaviours

4.5.1 Dental attendance behaviours

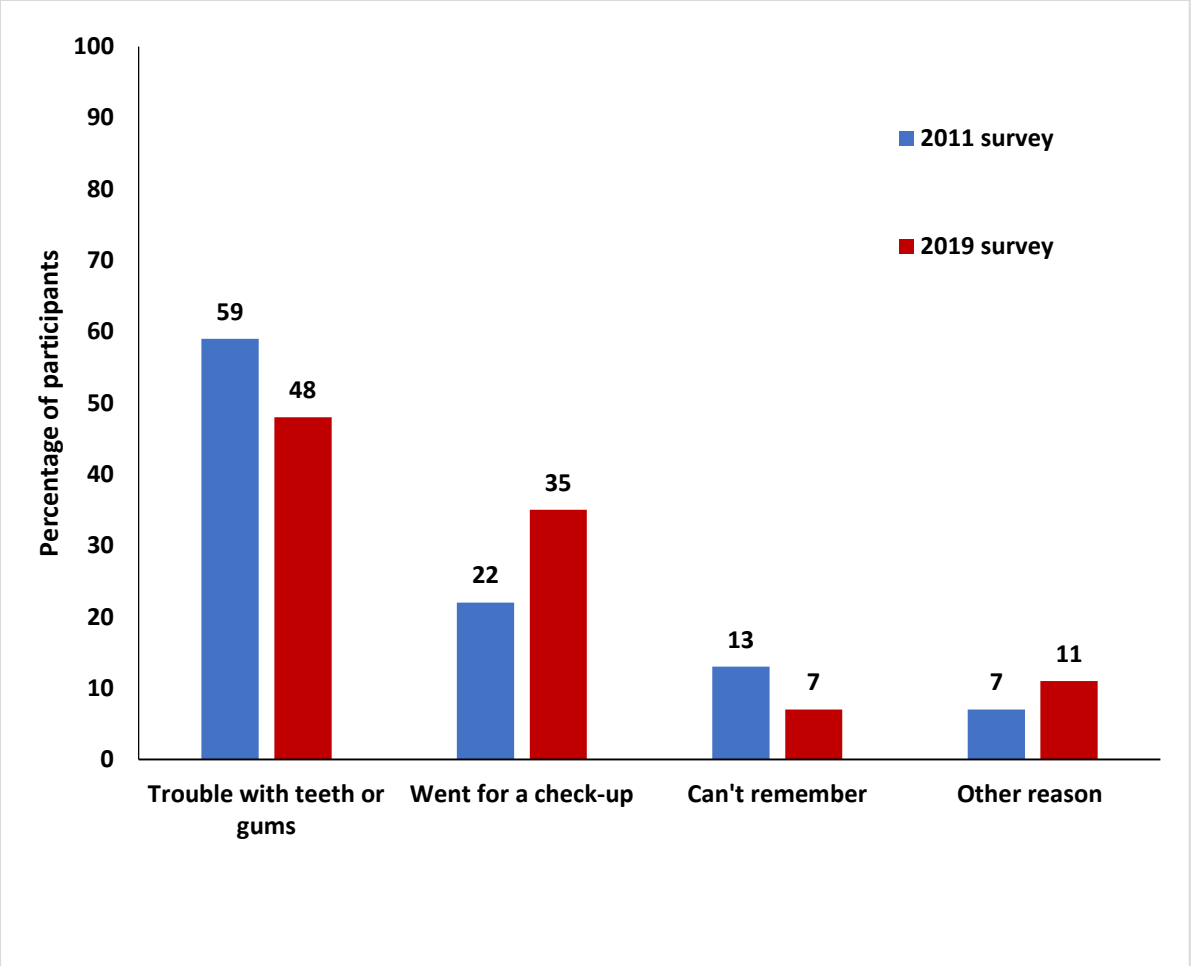
The reported pattern of dental attendance changed between the 2011 and 2019 surveys with significant differences noted in the reported interval between dental visits inside or outside prison by survey year ($X^2_{[4} = 61.29$; $p<0.001$). Significantly greater proportions of prisoners, therefore, in the 2019 (74%) than in the 2011 survey (45%) stated that they had attended the dentist inside or outside prison within the previous year, with lower proportions in 2019 than 2011 stating that they attended the dentist between one to five years or more (Figure 4.13).

Figure 4.13: Dental visiting pattern either inside or outside the prison: comparison by and survey year



Differences between the survey years for the reasons for dental attendance were also noted ($X^2_{[3]}$=22.23; p<0.001). Significantly greater proportions of prisoners in the 2019 (35%) than in the 2011 survey (22%) stated that they visited the dentist for a routine dental examination, and significantly lower proportions of prisoners in the 2019 survey (48%) than in the 2011 survey (59%) reported that they attended when experiencing 'trouble with their teeth or gums' (Figure 4.14).

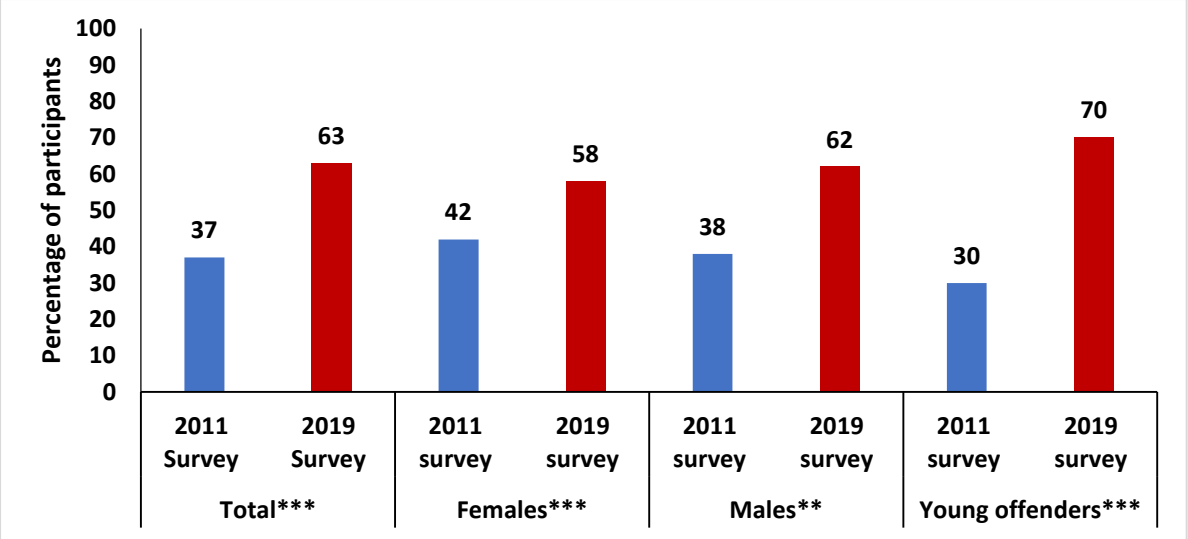
Figure 4.14: Reasons for last dental visit: comparison by survey year



4.5.2 Accessing prison dental services

Significantly greater proportions of prisoners in the 2019 survey (63%) than in the 2011 survey (37%) reported that they had accessed dental services while in prison ($X^2_{[1]}$=68.04; p<0.001). Significantly greater proportions of female ($X^2_{[1]}$=12.88; p<0.001), male ($X^2_{[1]}$=9.43; p=0.002) and young offenders ($X^2_{[1]}$=43.89; p<0.001) in 2019 than in 2011 stated that they had accessed prison dental services (Figure 4.15).

Figure 4.15: Proportion of prisoners who attended prison dentist: comparison by survey year and prison category

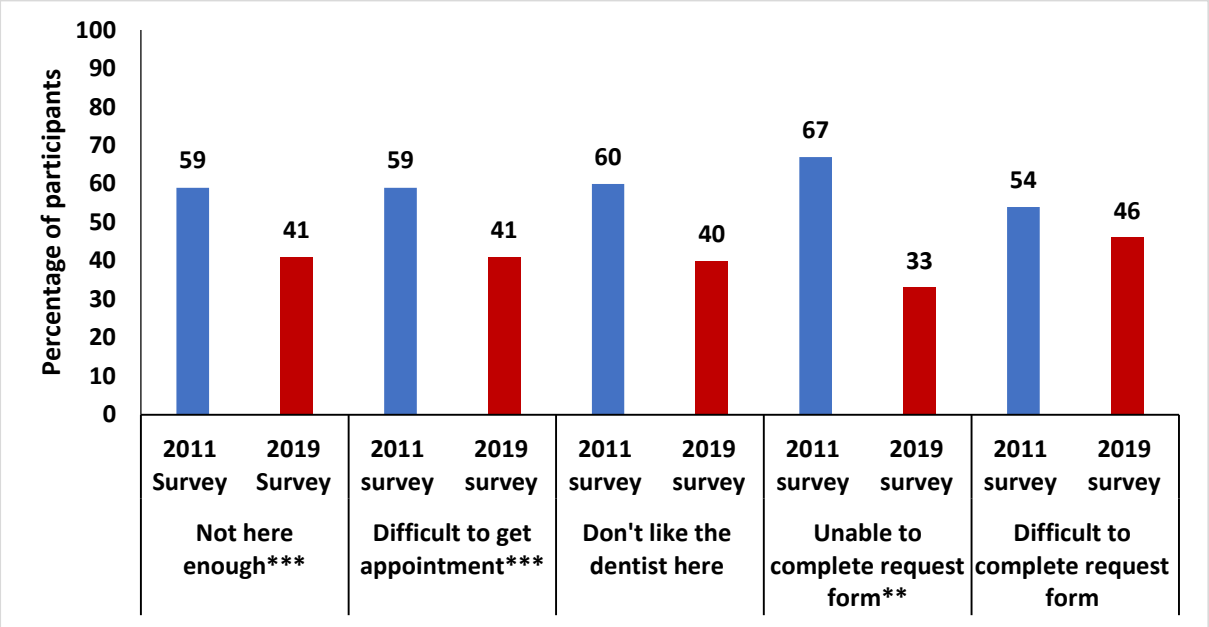


*p<0.05; **p<0.01; ***p<0.001

4.5.3 Perceived barriers to accessing prison dental services

The prisoners were asked to select barriers to accessing dental services when inside prisons (Figure 4.16). For perceived barriers to accessing dental care in prisons, significantly lower percentages of prisoners in the 2019 than the 2011 survey stated that, 'the dentist not there enough' ($X^2_{[1]}$=16.03; p< 0.001), that 'they had difficulty in getting the appointment' ($X^2_{[1]}$=22.96; p<0.001) and that 'they were unable to complete the request form' ($X^2_{[1]}$=7.08; p=0.008).

Figure 4.16: Proportion of prisoners who stated barriers to accessing dental care inside the prison: comparison by survey year



*p<0.05; **p<0.01; ***p<0.001

4.5.4 Reported dental treatment experiences

The most commonly reported past dental treatment mentioned in both 2011 and 2019 were local anaesthetic injections (92%), fillings (90%), extractions (73%), radiographs (80%) and scale and polish (66%). By 2019 significantly larger proportions of participants reported having received radiographs, extractions and scale and polishes compared with prisoners in the 2011 survey; whereas significantly lower proportions of participants in the 2019 survey than in the 2011 survey reported they had had general anaesthesia and/or inhalation sedation (Table 4.9). It was interesting to note that in 2019 compared with 2011, lower proportions of prisoners reported treatment for dental abscesses (p=0.07) but reported increased experience of fissure sealants and fluoride treatments (Table 4.9).

4.5.5 Reported dental treatment preferences

In both survey years prisoners were asked about their dental treatment preferences regarding the treatment of a 'painful front' and/or 'back tooth'. Three hundred and five prisoners in the 2019 survey (52%) and 284 prisoners in the 2011 survey (48%) stated that they would prefer a front tooth to be filled/crowned rather than extracted ($X^2_{[1]}$=0.38; p=0.54). Significant differences were also noted between the two survey years with greater proportions of prisoners in the 2019 survey (54%) stating that they would 'prefer a back tooth to be filled rather than taken out' than in the 2011 survey (46%) ($X^2_{[1]}$=5.00; p=0.02). Fifty-five percent of women in 2019 compared with 45 percent of women in the 2011 survey stated that they would prefer a back tooth 'filled' rather than extracted ($X^2_{[1]}$=7.09; p=0.008). No other significant differences were shown.

Table 4.9: Comparison of reported past dental treatments by survey year

Treatment received	2011 Survey n (%)	2019 Survey n (%)	X^2	p
Injection in gum	292 (48)	315 (52)	0.61	0.44
Fillings	289(48)	309 (52)	0.02	0.89
X-rays	**229 (45)** §	**278 (55)**	**5.77**	**0.02**
Extractions	**181(42)**	**247 (57)**	**4.59**	**0.03**
Scale and polish	**149 (39)**	**234 (61)**	**19.40**	**<0.001**
Abscess	132 (51)	128 (49)	3.23	0.07
Fissure sealants	84 (45)	101 (55)	0.06	0.81
General anaesthetic	**109 (52)**	**101 (48)**	**4.87**	**0.03**
Fluoride treatments	60 (39)	93 (61)	0.46	0.50
Dentures	59 (40)	89 (60)	2.46	0.12
Crowns	66 (46)	78 (54)	0.01	0.93
Inhalational sedation (RA)	**95 (59)**	**66 (41)**	**13.42**	**<0.001**
IV sedation	49 (53)	44 (47)	2.14	0.14
Bridge work	33 (49)	34 (51)	0.68	0.41

§: Statistically significant differences presented in bold

4.5.6 Reported toothbrushing behaviours

In 2011 and 2019 the total proportion of participants who stated they brushed their teeth in prison was 89% and at home was 77%. There was no significant difference in the proportions of participants in 2011 and 2019 who brushed their teeth when in prison ($X^2_{[1]}$=1.06; p=0.30) but significantly larger proportions of participants in 2019 (81%) than in 2011 (74%) said they brushed their teeth when at home ($X^2_{[1]}$=5.42; p=0.02). Over 80% of women ($X^2_{[1]}$=0.46; p=0.48), 90% of male prisoners ($X^2_{[1]}$=0.24; p=0.62) and over 85% of young offenders ($X^2_{[1]}$=0.75; p=0.19) in 2011 and 2019 reported they brushed their teeth when in prison. Greater proportions of male prisoners in 2019 (75%) than in 2011 (56%) stated they brushed their teeth at home ($X^2_{[1]}$=10.37; p=0.001) and greater proportions of young offenders in 2019 (89%) than in 2011 (89%) stated they brushed their teeth at home ($X^2_{[1]}$=4.37; p=0.04). No significant differences in toothbrushing at home was noted for women in 2011 (87%) and 2019 (82%) ($X^2_{[1]}$=0.97; p=0.32).

4.5.7 Reported sugar consumption behaviours

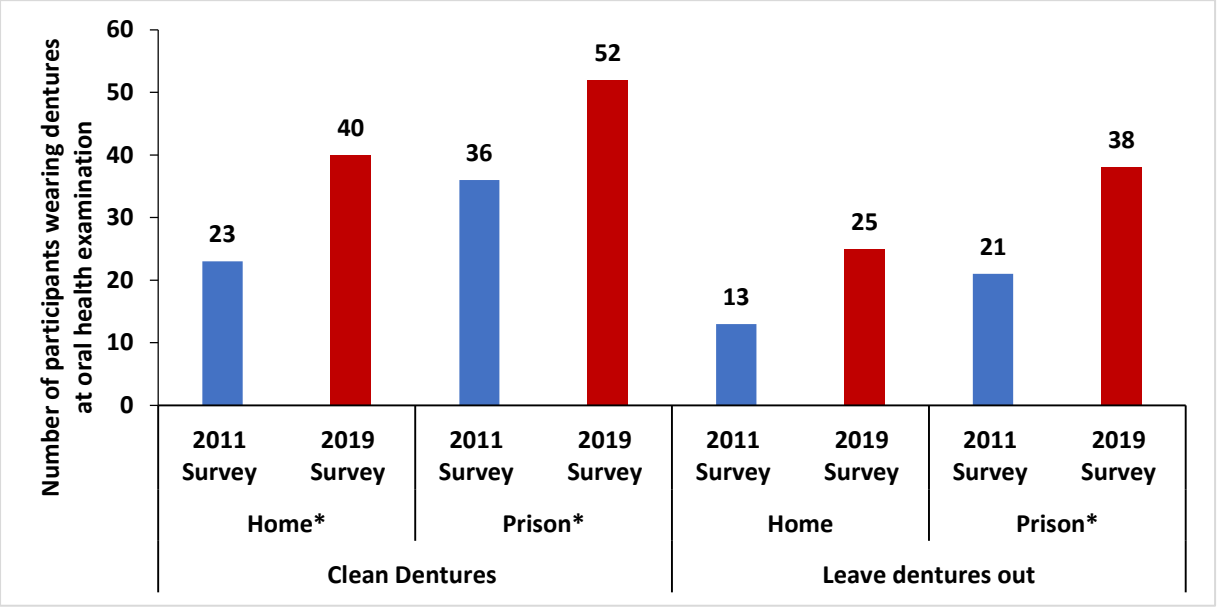
In 2011 and 2019 the total proportion of participants who stated they avoided sugar-containing foods and drinks in prison was 39% and at home was 32%. There was no significant difference in the proportions of participants in 2011 and 2019 who reported they avoided sugar-containing foods and drinks in prison ($X^2_{[1]}$=0.16; p=0.68) or at home ($X^2_{[1]}$=0.15; p=0.70). Although no significant differences were shown for women ($X^2_{[1]}$=0.05; p=0.82), male prisoners ($X^2_{[1]}$=0.14; p=0.71) or young offenders ($X^2_{[1]}$=1.22; p=0. 72) for avoiding sugar-containing foods and drinks in prison by survey year, significantly larger proportions of men in 2019 (32%) than in 2011 (21%) ($X^2_{[1]}$=4.02; p<0.05) reportedly avoided sugar-containing foods when at home. No significant differences for avoiding sugar-containing foods and drinks at home for women ($X^2_{[1]}$=2.75; p=0.10) or younger offenders ($X^2_{[1]}$=0.34; p=0.55).

4.5.8 Reported denture care and hygiene

Information on the 45 participants in the 2011 survey and the 55 participants in the 2019 survey who wore dentures at the time of oral examination was examined by reported denture care and hygiene practices inside and outside the prison (Figure 4.17). Significantly greater proportions of denture wearing prisoners in the 2019 survey (63%) compared with prisoners in the 2011 survey (37%) stated

that they cleaned their dentures when liberated and at home ($X^2_{[1]}$=4.42; p=0.04). Similarly, significantly greater proportions of prisoners in the 2019 survey (59%) than those in the 2011 survey (41%) stated that they cleaned their dentures when in prison ($X^2_{[1]}$=4.01; p=0.01). Greater proportions of prisoners in the 2019 (66%) than those in the 2011 survey (34%) stated that they left their dentures out at night when liberated and at home ($X^2_{[1]}$=2.62; p<0.05) and when in prison (64% in the 2019 survey and 36% in the 2011 survey ($X^2_{[1]}$=4.63; p=0.03).

Figure 4.17: Comparison of reported denture care and hygiene by survey year



*p<0.05; **p<0.01; ***p<0.001

4.6 Dental decay experience

4.6.1 Dental decay experience: $D_{3cv}MFT$

With regards to dental decay experience ($D_{3CV}MFT$), prisoners in the 2019 survey had a significantly higher mean $D_{3CV}MFT$ than those who participated in the 2011 survey. Women prisoners in the 2019 compared with females in the 2011 survey had significantly higher mean $D_{3CV}MFT$. Although mean $D_{3CV}MFT$ of male prisoners and young offenders was higher in 2019 than in the 2011 survey the difference did not approach statistical significance (Table 4.10).

4.6.2 Dental decay experience: decayed teeth ($D_{3cv}T$)

Prisoners in the 2019 survey had significantly higher mean numbers of decayed teeth into dentine ($D_{3CV}T$) compared with prisoners in the 2011 survey. Women and male prisoners and young offenders in the 2019 survey had significantly higher mean numbers of $D_{3CV}T$ compared with those who participated in the 2011 survey (Table 10).

4.6.3 Dental decay experience: missing teeth (MT)

There was no statistical difference in the total mean numbers of missing teeth (MT) between the two survey years, however, increases in the mean numbers of MT were noted for female participants and small decreases in the mean number of MT for male prisoners and young offenders between the 2011 and 2019 surveys (Table 4.10).

4.6.4 Dental decay experience: filled teeth (FT)

There was an increase in the mean number of filled teeth (FT) between the two survey years and prison categories. Prisoners in the 2019 survey had a higher mean number of filled teeth (FT) compared with prisoners in the 2011 survey, with greater mean numbers of filled teeth noted in male prisoners and young offenders in the 2019 compared with the 2011 survey (Table 4.10).

Table 4.10: Comparison of dental decay experience by survey year and prison category

		2011 Survey Mean (95% CI)	2019 Survey Mean (95% CI)	t	p
Dental decay experience ($D_{3cv}MFT$)	Total	**12.17 (11.20, 13.14)§**	**13.70 (12.75, 14.64)**	**2.22**	**0.03**
	Female	**14.04 (12.19, 15.90)**	**17.32 (15.34, 19.30)**	**2.40**	**0.02**
	Male	15.55 (13.94, 17.16)	16.68 (15.32, 18.04)	1.06	0.29
	Young Offenders	6.75 (5.70, 7.70)	7.32 (6.34, 8.13)	0.83	0.41
Decayed teeth into dentine ($D_{3cv}T$)	Total	**1.50 (1.25, 1.75)**	**2.93 (2.56, 3.29)**	**6.33**	**<0.001**
	Female	**1.19 (0.80, 1.58)**	**3.10 (2.22, 3.99)**	**3.93**	**<0.001**
	Male	**1.06 (0.72, 1.41)**	**2.59 (2.12, 3.05)**	**5.23**	**<0.001**
	Young Offenders	**2.27 (1.75, 2.79)**	**3.21 (2.54, 3.87)**	**2.30**	**0.03**
Missing teeth (MT)	Total	6.99 (6.03, 7.96)	6.68 (5.80, 7.56)	0.47	0.64
	Female	8.78 (6.88, 10.67)	10.34 (8.18, 12.51)	1.08	0.28
	Male	9.83 (8.06, 11.61)	8.54 (7.20, 9.89)	1.15	0.25
	Young Offenders	2.24 (1.55, 2.94)	1.67 (1.12, 2.21)	1.30	0.20
Filled teeth (FT)	Total	3.67 (3.25, 4.10)	4.09 (3.69, 4.50)	1.42	0.15
	Female	4.08 (3.23, 4.92)	3.87 (3.12, 4.62)	0.36	0.72
	Male	4.65 (3.96, 5.34)	5.56 (4.85, 6.26)	1.81	0.07
	Young Offenders	2.23 (1.66, 2.81)	2.46 (1.99, 2.93)	0.61	0.54

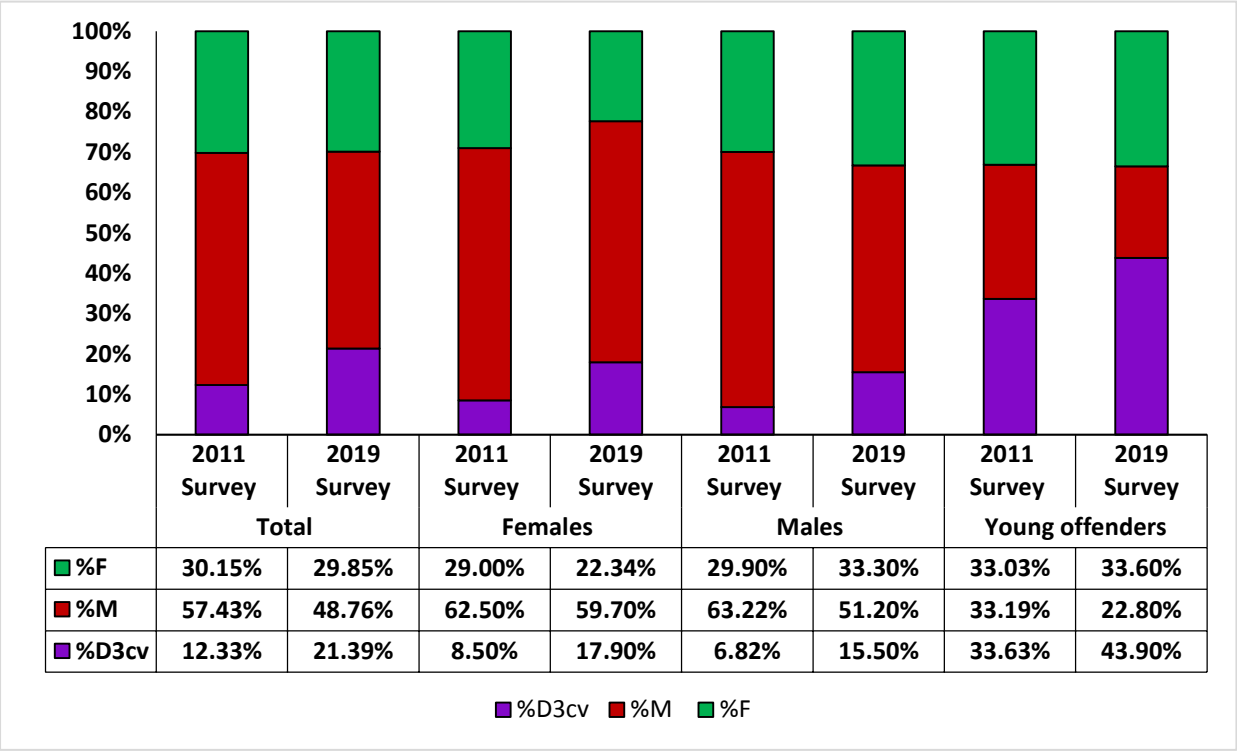
§: Statistically significant differences presented in bold

4.6.5 Dental decay experience: the care index and the D3cvMFT

The overall care index in both the 2011 and the 2019 surveys was 30%. An increase was noted in the care index for male prisoners in the 2019 to 40% from 38% in the 2011 survey and for young offenders from 18% in 2011 to 20% in 2019. A reduction in the care index for women, however, was observed with a fall from 34% in 2011 to 28% in 2019.

The mean number of missing teeth (MT) accounted for the largest proportion of mean $D_{3cv}MFT$ for female and male prisoners in both survey years, however, for young offenders mean numbers of decayed teeth (D_3cvT) accounted for the highest proportion of the $D_{3cv}MFT$ in both the 2019 and 2011 surveys (Figure 4.18).

Figure 4.18: Comparison of the proportions of the $D_{3cv}MFT$ by survey year and prison category



	2011 Survey	2019 Survey	2011 Survey	2019 Survey	2011 Survey	2019 Survey	2011 Survey	2019 Survey
	Total		Females		Males		Young offenders	
%F	30.15%	29.85%	29.00%	22.34%	29.90%	33.30%	33.03%	33.60%
%M	57.43%	48.76%	62.50%	59.70%	63.22%	51.20%	33.19%	22.80%
%D3cv	12.33%	21.39%	8.50%	17.90%	6.82%	15.50%	33.63%	43.90%

4.6.6 Dental decay experience by prison experience

Dental decay experience by years in prison

When the analysis of $D_{3cv}MFT$ was inspected across survey year and prison category it was found that the effect of placing the number of years in prison as a co-variant was significant in explaining only 1% of the mean $D_{3cv}MFT$ ($F_{[1,456]}=5.19$; $p=0.02$). This means that the greater the number of years of imprisonment resulted in slightly greater $D_{3cv}MFT$. For comparison purposes the level of explanation of the $D_{3cv}MFT$ was 15% for prison category ($F_{[2,456]}=41.17$; $p<0.001$).

Similarly, when the analysis of decayed teeth into dentine ($D_{3cv}T$) was inspected across survey year and prison category it was found that the effect of placing the number of years of imprisonment as a co-variant did not assist in explaining the mean number of $D_{3cv}T$ ($F_{[1,456]}=0.41$; $p=0.52$). This means that the number of years of imprisonment did not result in greater experience of decayed teeth into dentine. For comparison purposes the level of explanation of decayed experience was 3% by survey year ($F_{[1,456]}=15.41$; $p<0.001$) and 2% for prison category ($F_{[2,456]}=3.70$; $p=0.03$).

Dental decay experience by number of remands

When the analysis of $D_{3cv}MFT$ was inspected across survey year and prison category it was found that the effect of placing the number of remands as a co-variant was highly significant but explained only 3% of the mean $D_{3cv}MFT$ ($F_{[1,461]}=11.76$; $p<0.001$). This means that the greater the number of remands (transformed as a log scale for distribution reasons) resulted in an increased $D_{3cv}MFT$. For comparison purposes the level of explanation of the $D_{3cv}MFT$ was 2% by survey year ($F_{[1,461]}=7.57$; $p=0.006$) and 24% for prison category ($F_{[2,461]}=71.13$; $p<0.001$).

Similarly, when the analysis of decayed teeth into dentine ($D_{3cv}T$) was inspected across survey year and prison category it was found that the effect of placing the number of remands as a co-variant was

highly significant in explaining (4%) the mean number of $D_{3cv}T$ ($F_{[1,461]}$=17.57; p<0.001). This means that the greater the number of remands (transformed as a log scale for distribution reasons) resulted in greater experience of decayed teeth into dentine. For comparison purposes the level of explanation of decayed experience was 3% by survey year ($F_{[1,461]}$=28.05; p<0.001) and 6% for prison category ($F_{[2,461]}$=7.51: p<0.001).

Dental decay experience by number of times imprisoned

When the analysis of $D_{3cv}MFT$ was inspected across survey year and prison category it was found that the effect of placing the number of years in prison as a co-variant was highly significant in explaining (2%) the mean $D_{3cv}MFT$ ($F_{[1,482]}$=7.49; p=0.006). This means that the greater the number of times imprisoned resulted in greater $D_{3cv}MFT$. For comparison purposes the level of explanation of the $D_{3cv}MFT$ was 1% by survey year ($F_{[1,482]}$=4.43; p=0.04) and 22% for prison category ($F_{[2,482]}$=68.21; p<0.001).

Similarly, when the analysis of decayed teeth into dentine ($D_{3cv}T$) was inspected across survey year and prison category it was found that the effect of placing the number of times imprisoned as a co-variant did not assist in explaining the mean number of $D_{3cv}T$ ($F_{[1,482]}$=1.34; p=0.25). This means that the number of times in prison did not result in greater experience of decayed teeth into dentine.

4.6.7 Dental decay experience: unmet treatment need

The prevalence of dental caries ($D_{3CV}MFT>0$), unmet treatment need ($D_{3CV}T>0$) and preventive need (D_1T) by survey year and prison category are shown in Table 4.11. The $D_{3CV}MFT>0$ prevalence was 96% in the 2011 and 97% in the 2019 surveys with significantly larger proportions of participants in the 2019 (68%) than those in the 2011 survey (48%) having unmet treatment needs, with greater proportions of male prisoners having unmet treatment needs ($D_{3CV}T>0$) in the 2019 (71%) than in 2011 survey. Fifteen percent of the participants in the 2019 survey had enamel lesions requiring preventive treatment compared with 14% in the 2011 survey.

Table 4.11: Comparison of unmet treatment and preventive dental treatment need by survey year and prison category

		2011 survey % (n)	**2019 survey** % (n)	X^2	**p**
Prevalence of dental caries: $D_{3CV}MFT>0$	**Total**	96 (287)	97(336)	0.03	0.87
	Female	98 (88)	97 (84)	¥	0.48
	Male	99 (107)	98(141)	¥	0.63
	Young offender	92 (92)	95 (111)	0.36	0.55
Untreated decay (Unmet need) $D_{3CV}T>0$	**Total**	**48 (144)**	**68 (236)**	**25.19**	**<0.001**
	Female	46 (41)	56 (49)	2.05	0.15
	Male	**37 (40)**	**71(102)**	**29.36**	**<0.001**
	Young offender	64(63)	73 (85)	2.02	0.16
Preventive treatment need	**Total**	14 (41)	15 (53)	0.28	0.60
	Female	10 (9)	6 (6)	0.55	0.46
	Male	14 (15)	18 (27)	1.12	0.29
	Young offender	18 (17)	17 (20)	0.00	0.99

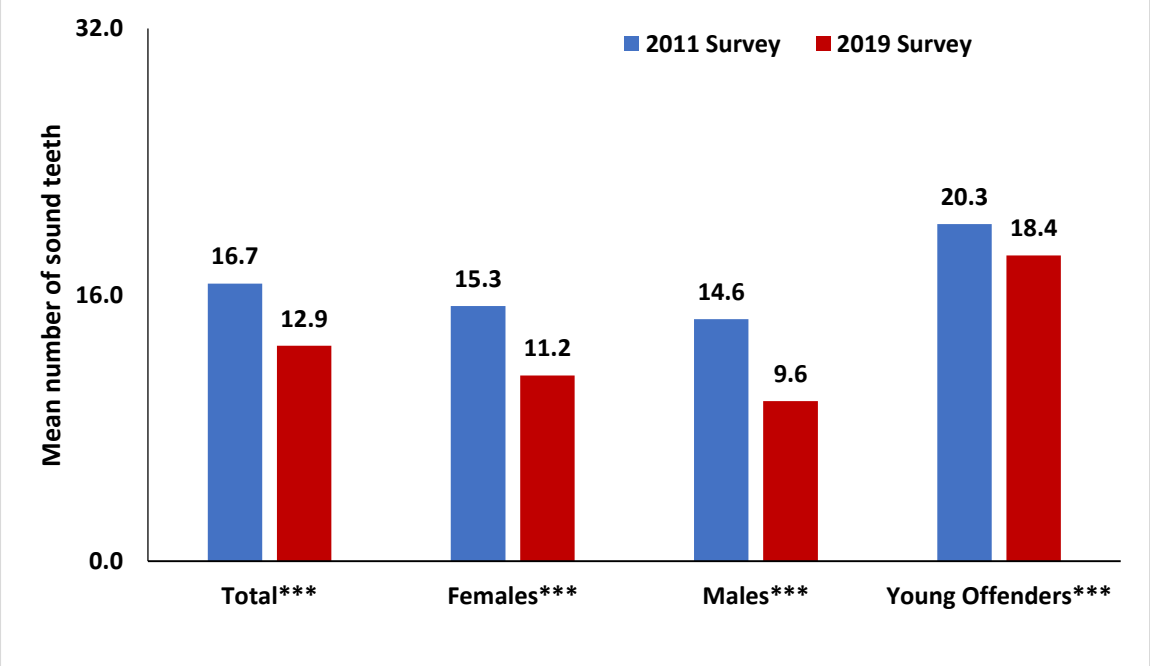
¥ Fisher's Exact Probability Test

4.6.8 Dental decay experience: sound and untreated teeth

Prisoners in both survey years had a mean of 23 teeth present. No significant differences were observed in the mean number of standing teeth between female prisoners, male prisoners and young offenders between the two survey years. Prisoners in the 2011 survey had significantly higher mean

numbers of sound teeth (a mean difference of four teeth) than those in the 2019 survey (t=6.23; p<0.001) (Figure 4.19). There was a significant reduction in the mean number of sound teeth in 2019 by prison category. Prisoners in the 2019 survey had significantly higher mean numbers of teeth which had been fissure sealed than those in the 2011 survey (t=2.66; p<0.001). Young offenders had a mean increase of 0.5 of a tooth fissure sealed in the 2019 compared with the participants in the 2011 survey (t=2.97; p=0.003).

Figure 4.19: Comparison of the mean number of sound teeth by survey year and prison category



*p<0.05; **p<0.01; ***p<0.001

4.7 Periodontal health: plaque scores

Two hundred and fifty-nine prisoners examined in the 2011 and 220 in 2019 had at least one or more of the six index teeth affected by plaque. Prisoners in the 2019 survey had a highly and significantly lower mean total, upper and lower plaque scores than those in the 2011 survey (Table 4.12).

Table 4.12: Comparison of mean plaque scores by survey year

	2011 Survey Mean (95% CI)	2019 survey Mean (95% CI)	t	p
Total Plaque Score	0.77 (0.67, 0.86)	0.58 (0.52, 0.64)	3.25	<0.001
Upper Plaque Score	0.71 (0.61, 0.81)	0.51 (0.45, 0.58)	3.33	<0.001
Lower Plaque Score	0.78 (0.68, 0.89)	0.61 (0.55, 0.68)	2.73	0.006

Female prisoners and young offenders in the 2019 survey had a significantly lower mean total, upper and lower plaque score than those in the 2011 survey. Male prisoners, however, in the 2019 survey had significantly higher mean total, upper and lower plaque score than those in the 2011 survey (Table 4.13).

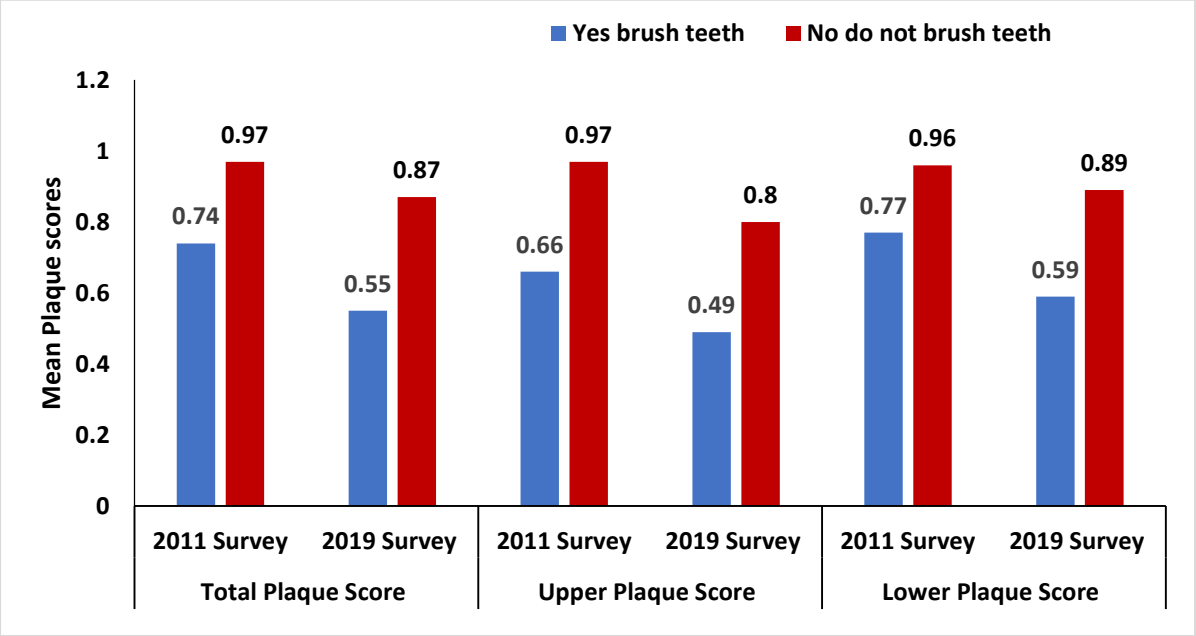
Table 4.13: Mean plaque scores: comparison by Prison category and survey year

Plaque Score		2011 Survey Mean (95% CI)	2019 survey Mean (95% CI)	t	p
Total	Female	0.99 (0.78, 1.18)	0.63 (0.50, 0.77)	3.02	0.003
	Male	0.45 (0.32, 0.57)	0.81 (0.71, 0.91)	4.52	<0.001
	Young Offenders	0.89 (0.73, 1.06)	0.26 (0.12, 0.33)	7.02	<0.001
Upper	Female	0.88 (0.69, 1.07)	0.51 (0.36, 0.65)	3.06	0.003
	Male	0.40 (0.26, 0.53)	0.76 (0.65, 0.87)	4.14	<0.001
	Young Offenders	0.85 (0.68, 1.03)	0.24 (0.17, 0.32)	6.31	<0.001
Lower	Female	1.03 (0.82, 1.24)	0.73 (0.58, 0.88)	2.33	0.02
	Male	0.44 (0.30, 0.57)	0.83 (0.73, 0.93)	4.57	<0.001
	Young Offenders	0.93 (0.75, 1.10)	0.28 (0.20, 0.35)	6.80	<0.001

Periodontal health: plaque scores and reported toothbrushing behaviours

Prisoners who stated that they brushed their teeth while in prison had lower mean plaque scores in both survey years compared with prisoners who stated they did not brush their teeth while in prison. Interestingly, among prisoners who brushed their teeth while in prison, in the 2019 survey had significantly lower mean plaque scores compared with those who stated they brushed their teeth in the 2011 survey for total (t=3.32; p<0.001), upper (t=3.15; p=0.001) and lower plaque scores (t=2.79; p=0.006) (Figure 4.20).

Figure 4.20: Comparison of mean plaque scores by reported toothbrushing in prison by survey year



Periodontal health: plaque scores by years in prison

When the analysis of total plaque scores was inspected across survey year and prison category it was found that the effect of placing the number of years in prison as a co-variant did not assist in explaining the mean total plaque scores ($F_{[1,431]}$=0.85; p=0.36). This means that the number of years of imprisonment did not result in greater experience of total plaque scores. For comparison purposes the level of explanation of total plaque scores was 4% by prison category ($F_{[2,431]}$=8.59; p<0.001) and 6% by the interaction of survey year with prison category $F_{[2,431]}$=14.270; p<0.001).

Similarly, when the analysis of upper plaque scores was inspected across survey year and prison category it was found that the effect of placing the number of years of imprisonment as a co-variant

did not assist in explaining the mean number of upper plaque scores ($F_{[1,431]}$=1.78; p=0.18). This means that the number of years of imprisonment did not result in greater experience of upper plaque scores. For comparison purposes the level of explanation of upper plaque score was 3% by prison category ($F_{[2,431]}$= 5.06; p=0.007) and 5% by the interaction of survey year with prison category ($F_{[2,431]}$=10.03; p<0.001).

Finally when the analysis of upper plaque scores was inspected across survey year and prison category it was found that the effect of placing the number of years of imprisonment as a co-variant did not assist in explaining the mean number of upper plaque scores ($F_{[1,431]}$=0.32; p=0.57). This means that the number of years of imprisonment did not result in greater experience of lower plaque scores. For comparison purposes the level of explanation of lower plaque score was 3% by prison category ($F_{[2,431]}$=7.31; p=0.001) and 6% by the interaction of survey year with prison category ($F_{[2,431]}$=14.50; p<0.001).

Periodontal health: plaque scores by number of times in remand

When the analysis of total plaque scores was inspected across survey year and prison category it was found that the effect of placing the number of times in remand (transformed as a log scale for distribution reasons) as a co-variant did not assist in explaining the mean total plaque scores ($F_{[1,443]}$=2.30; p=0.13). This means that the number of times in remand did not result in greater experience of total plaque scores. For comparison purposes the level of explanation of total plaque scores was 2% by survey year ($F_{[1,443]}$=8.64; p=0.003), 3% by prison category ($F_{[2, 443]}$=8.59; p<0.001) and 11% by the interaction of survey year with prison category ($F_{[2, 443]}$=14.270; p<0.001).

Similarly, when the analysis of upper plaque scores was inspected across survey year and prison category it was found that the effect of placing the number of times in remand as a co-variant did not assist in explaining the mean number of upper plaque scores ($F_{[1,443]}$=1.99; p=0.17). This means that the number of times in remand did not result in greater experience of upper plaque scores. For comparison purposes the level of explanation of upper plaque score was 2% by survey year ($F_{[1,443]}$=7.99; p=0.005) and 10% for the interaction of survey year with prison category ($F_{[2,443]}$=23.13; p<0.001).

Finally when the analysis of lower plaque scores was inspected across survey year and prison category it was found that the effect of placing the number of times in remand as a co-variant did not assist in explaining the mean number of lower plaque scores ($F_{[1,443]}$= 1.87; p=0.17). This means that the number of times in remand did not result in greater experience of lower plaque scores. For comparison purposes the level of explanation of lower plaque score was 1% by survey year ($F_{[1,443]}$=6.45; p=0.01) 4% by prison category ($F_{[2,443]}$=8.71; p<0.001) and 11% for the interaction of survey year with prison category ($F_{[2,443]}$=26.72; p<0.001).

Periodontal health: plaque scores by number of times imprisoned

When the analysis of total plaque scores was inspected across survey year and prison category it was found that the effect of placing the number of times in prison as a co-variant did not assist in explaining the mean total plaque scores ($F_{[1,463]}$=0.52; p=0.47). This means that the number of times in prison did not result in greater experience of total plaque scores. For comparison purposes the level of explanation of total plaque scores was 2% by survey year ($F_{[1,463]}$=7.75; p=0.006), 2% by prison category ($F_{[2, 463]}$=3.72; p=0.03) and 10% by the interaction of survey year with prison category ($F_{[2, 463]}$=25.47; p<0.001).

Similarly, when the analysis of upper plaque scores was inspected across survey year and prison category it was found that the effect of placing the number of times in prison as a co-variant did not

assist in explaining the mean number of upper plaque scores ($F_{[1,463]}$=1.37; p=0.24). This means that the number of times in prison did not result in greater experience of upper plaque scores. For comparison purposes the level of explanation of upper plaque score was 1% by survey year ($F_{[1,463]}$=5.95; p=0.02) and 9% for the interaction of survey year with prison category ($F_{[2,463]}$=22.90; p<0.001).

Finally when the analysis of lower plaque scores was inspected across survey year and prison category it was found that the effect of placing the number of times in prison as a co-variant did not assist in explaining the mean number of lower plaque scores ($F_{[1,463]}$=2.19; p=0.14). This means that the number of times in prison did not result in greater experience of lower plaque scores. For comparison purposes the level of explanation of lower plaque score was 1% by survey year ($F_{[1,463]}$=4.47; p=0.04), 2% by prison category ($F_{[2,463]}$=4.12; p=0.02) and 9% by the interaction of survey year with prison category ($F_{[2,463]}$=22.48; p<0.001).

4.8 Conclusions

The comparison of the 2011 with the 2019 survey of the oral health and psychosocial needs of people in prison in Scottish prisons showed:

[1] Few differences if any were found by survey year regarding education attainment, employment status, childhood residential care or experience of homelessness, suggesting that people in prison represented a group of people who may be considered to have the characteristics of people described as experiencing social exclusion. The need remains for people in prison on release to have the opportunity 'to maximise their capabilities and have control over their lives' (Marmot *et al.*, 2010). It may be suggested that peer interventions enable people to communicate with others and attain experiential learning resulting in educational and/or vocational qualifications. Peer interventions for health and oral health will not only promote health in its widest sense but also assist in allowing people in custody to become more socially included in society and to have 'fair employment and good work' (Marmot *et al.*, 2010).

[2] The change in dental service provider from the Scottish Prison Service to the NHS, Public Dental Service in late 2011 appears to have improved access to dental care in prison, reduced perceived barriers to accessing dental care in prison and enhanced treatment preferences in 2019. Improved oral health-related quality of life supports this conclusion that the treatment afforded to people in Scottish prisons in 2019 compared with 2011, was associated with a reduction of oral health impacts associated with toothache and pain and oral health functioning.

[3] There was little change in dental caries experience, with the mean number of teeth extracted or restored by survey year remaining similar. The incidence of decayed teeth increased by survey year and was affected by prison category with a large unmet treatment need noted in 2019. Despite the change in service provider no improvement in dental caries experience was noted.

[4] Periodontal health as indicated by plaque scores and oral cleanliness showed significant improvements by survey year and prison category. Of interest to note was the relationship between reported and increased toothbrushing behaviours when in prison with reduced plaque scores in 2019 than in 2011.

[5] The introduction and implementation of the oral health improvement intervention in 2014, Mouth Matters, with its emphasis on the promotion of toothbrushing, denture hygiene and accessing and attending for dental care, would seem to be associated with improved oral health-related attitudes and oral hygiene behaviours as reflected in the lower plaque scores by survey year found in the 2019 than in the 2011 survey. Few if any changes, however, were noted in the avoidance of sugar containing foods and drinks in prison and, for people in high security prisons and on longer term sentences. This is an important finding since there is a need to develop interventions which are peer implemented by and for people in custody, to promote health learning capacity, cognitive and psychosocial skills set to improve not only oral health and health but also life skills.

5

Recommendations

5.1 General Recommendations

- Gender specific recommendations should be tailored to the needs of the female prisoners, male prisoners and young offenders.
- Prisoners should be provided basic life skills for maintenance of health, oral health and mental health and well-being.
- Prisoners should be trained as peer oral health mentors and complete SQA educational awards.
- Access to healthcare and health promotion should be part of pre-release preparations.
- Dental health care and oral health promotion protocols should be nested in Public Health Scotland policy documents.

5.2 Dental health care recommendations

- Dental health services and oral health promotion should be part of a multidisciplinary and multi-sectorial approach within and across the prison estate.
- There should be an equitable distribution of dental treatment provision protocols within the prison estate as provided by the NHS Boards.
- Prisoners should be provided with the skills to access dental health services within and out with the prison estate.
- There should be an equitable distribution of oral health-health promotion initiatives across the prison estate.
- There should be the provision of dental through-care and oral health promotion from within the prison to the outside world.
- Access to oral health promotion services should be an integral part of pre-release preparation.
- Access to dental health services should be an integral part of pre-release preparations.

5.3 Training and continuing professional development recommendations

- Training of dental health professionals should include effective communication with prisoners inside and with people during and after liberation.
- Training of all those working within the prison sector should provide tailored oral health promotion interventional to prisoners.
- Training of all those working within the criminal justice sector should provide tailored oral health promotion interventions to people during and after liberation.

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Appendix 1: Ethics Documents

HEADQUARTERS

Research
Strategy and Innovation

Calton House
5 Redheughs Rigg
EDINBURGH
EH12 9HW

Direct dialing: 0131 330 3766
Switchboard: 0131 330 3500

Prof Ruth Freeman
Mouth Matters Oral Health Survey
Dental Health Services Research Unit
Level 9
School of Dentistry
University of Dundee
DD1 4HN

11 May 2017

Dear Ruth

ORAL HEALTH SURVEY IN SCOTTISH PRISONS

The SPS Research Access and Ethics Committee met in April and was content to approve access for the Prisons Oral Health Survey study.

You have already signed the standard access regulations which are held on file in Calton House.

The protocols and processes that applied in previous SOHIPP surveys will be overseen by colleagues in SPS Health and Well-being.

The RAEC wished you well in the completion of the study and looked forward to receiving a copy of your research report in due course.

Yours sincerely

James K Carnie

Dr James Carnie
SPS Research

TAyside medical Science Centre
Residency Block Level 3
George Pirie Way
Ninewells Hospital and Medical School
Dundee DD1 9SY

Professor Ruth E. Freeman
Professor of Dental Public Health Research
Dental Health Services Research Unit,
University of Dundee
School of Dentistry
Park Place
Dundee
DD1 4HN

Date: 11 August 2017
Your Ref:
Our Ref: LR/AG
Enquiries to: Arlene Grubb
Direct Line: 01382 383848
Email: eosres.tayside@nhs.net

Dear Professor Freeman

Study title:	**Scottish Oral Health Improvement Prison Programme (SOHIPP) Survey**
REC reference:	**17/ES/0083**
Protocol number:	**N/A**
IRAS project ID:	**229441**

Thank you for your letter of 10 August 2017, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

We plan to publish your research summary wording for the above study on the HRA website, together with your contact details. Publication will be no earlier than three months from the date of this opinion letter. Should you wish to provide a substitute contact point, require further information, or wish to make a request to postpone publication, please contact hra.studyregistration@nhs.net outlining the reasons for your request.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Conditions of the favourable opinion

The REC favourable opinion is subject to the following conditions being met prior to the start of the study.

You should notify the REC once all conditions have been met (except for site approvals from host organisations) and provide copies of any revised documentation with updated version numbers. Revised documents should be submitted to the REC electronically from IRAS. The REC will acknowledge receipt and provide a final list of

the approved documentation for the study, which you can make available to host organisations to facilitate their permission for the study. Failure to provide the final versions to the REC may cause delay in obtaining permissions.

Management permission must be obtained from each host organisation prior to the start of the study at the site concerned.

Management permission should be sought from all NHS organisations involved in the study in accordance with NHS research governance arrangements. Each NHS organisation must confirm through the signing of agreements and/or other documents that it has given permission for the research to proceed (except where explicitly specified otherwise). Guidance on applying for NHS permission for research is available in the Integrated Research Application System, www.hra.nhs.uk or at http://www.rdforum.nhs.uk.

Where a NHS organisation's role in the study is limited to identifying and referring potential participants to research sites ("participant identification centre"), guidance should be sought from the R&D office on the information it requires to give permission for this activity.

For non-NHS sites, site management permission should be obtained in accordance with the procedures of the relevant host organisation.

Sponsors are not required to notify the Committee of management permissions from host organisations

Registration of Clinical Trials

All clinical trials (defined as the first four categories on the IRAS filter page) must be registered on a publically accessible database within 6 weeks of recruitment of the first participant (for medical device studies, within the timeline determined by the current registration and publication trees).

There is no requirement to separately notify the REC but you should do so at the earliest opportunity e.g. when submitting an amendment. We will audit the registration details as part of the annual progress reporting process.

To ensure transparency in research, we strongly recommend that all research is registered but for non-clinical trials this is not currently mandatory.

If a sponsor wishes to request a deferral for study registration within the required timeframe, they should contact hra.studyregistration@nhs.net. The expectation is that all clinical trials will be registered, however, in exceptional circumstances non registration may be permissible with prior agreement from the HRA. Guidance on where to register is provided on the HRA website.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Ethical review of research sites

NHS sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Non-NHS sites

I am pleased to confirm that the favourable opinion applies to the following research site(s), subject to site management permission being obtained prior to the start of the study at the site (see under 'Conditions of the favourable opinion below').

Research site	Principal Investigator / Local Collaborator
Scottish Prison Service Calton House,	Ms Nadja Almondes

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
Copies of advertisement materials for research participants [SOHIPPP Poster]	1.1	12 July 2017
Covering letter on headed paper [Response to EoSRES]		
Covering letter on headed paper [Response to EoSRES]		
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Co-Sponsorship Agreement]	4.0 280812	18 May 2017
IRAS Checklist XML [Checklist_10082017]		10 August 2017
Letter from sponsor [Sponsorship letter & insurance note]		10 May 2017
Other [Reply slip]	1.0	24 April 2017
Participant consent form [SOHIPP ICF (highlighted changes)]	1.3	10 August 2017
Participant information sheet (PIS) [PIS_dental survey (highlighted changes)]	1.3	10 August 2017
REC Application Form [REC_Form_12062017]		12 June 2017
Research protocol or project proposal [SOHIPP Survey - (highlighted changes)]	1.3	10 August 2017
Summary CV for Chief Investigator (CI) [Ruth Freeman CV]		
Validated questionnaire [Dental examination]	1.0	25 January 2017
Validated questionnaire [Oral Health Questionnaire (tracked changes)]	1.2	04 August 2017

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Reporting requirements

The attached document *"After ethical review – guidance for researchers"* gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Notification of serious breaches of the protocol
- Progress and safety reports

- Notifying the end of the study

The HRA website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

User Feedback

The Health Research Authority is continually striving to provide a high quality service to all applicants and sponsors. You are invited to give your view of the service you have received and the application procedure. If you wish to make your views known please use the feedback form available on the HRA website: http://www.hra.nhs.uk/about-the-hra/governance/quality-assurance/

HRA Training

We are pleased to welcome researchers and R&D staff at our training days – see details at http://www.hra.nhs.uk/hra-training/

17/ES/0083	Please quote this number on all correspondence

With the Committee's best wishes for the success of this project.

Yours sincerely

Dr Roberta Littleford
Chair

Email:eosres.tayside@nhs.net

Enclosures: "After ethical review – guidance for researchers" [SL-AR2]

Copy to: TASC

NHS
SCOTLAND
Research Ethics Service

East of Scotland Research Ethics Service (EoSRES)

TAyside medical Science Centre
Residency Block Level 3
George Pirie Way
Ninewells Hospital and Medical School
Dundee DD1 9SY

Professor Ruth E. Freeman
Professor of Dental Public Health Research
Dental Health Services Research Unit
University of Dundee
School of Dentistry
Park Place
Dundee
DD1 4HN

Date: 11 August 2017
Your Ref:
Our Ref: LR/**17/ES/0090**
Enquiries to: Mrs Lorraine Reilly
Direct Line: 01382 383878
Email: eosres.tayside@nhs.net

Dear Professor Freeman

Study title: **Scottish Oral Health Improvement Prison Programme (SOHIPP) Survey**
REC reference number: **17/ES/0083**
SSA reference number: **17/ES/0090**
Protocol number: **N/A**
IRAS project ID: **229441**

The REC gave a favourable ethical opinion to this study on .

Following site-specific assessment by the Committee, I am pleased to confirm the extension of the favourable opinion to the new sites and investigator listed below:

Research sites	Principal Investigator / Local Collaborator
HMP Addiewell, HMP Cornton Vale; HMP Dumfries; HMP Edinburgh; HMP Grampian; HMP Inverness; HMP Kilmarnock; HMP Castle Huntly; HMYOI Polmont; HMP Perth; HMP Shotts	Ms Nadja Almondes

The favourable opinion is subject to management permission or approval being obtained from the host organisation prior to the start of the study at the site concerned.
Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

disability confident EMPLOYER

17/ES/0083	Please quote this number on all correspondence

Yours sincerely

L Reilly

Mrs Lorraine Reilly
REC Manager

Email: eosres.tayside@nhs.net

Copy to: TASC
NHS Tayside R&D office

disability confident EMPLOYER

East of Scotland Research Ethics Service *(EoSRES)*

NHS SCOTLAND
Research Ethics Service

TAyside medical Science Centre
Residency Block Level 3
George Pirie Way
Ninewells Hospital and Medical School
Dundee DD1 9SY

Professor Ruth E. Freeman
Professor of Dental Public Health Research
Dental Health Services Research Unit, University of Dundee
School of Dentistry
Park Place
Dundee
DD1 4HN

Date: 21st February 2018
Your Ref:
Our Ref: LR/AG/17/ES/0083
Enquiries to: Arlene Grubb
Direct Line: 01382 383848
Email: eosres.tayside@nhs.net

Dear Professor Freeman

Study title: **Scottish Oral Health Improvement Prison Programme (SOHIPP) Survey**
REC reference: **17/ES/0083**
Protocol number: **N/A**
IRAS project ID: **229441**

Thank you for your letter of 21 February 2018. I can confirm the REC has received the documents listed below and that these comply with the approval conditions detailed in our letter dated 11 August 2017

Documents received

The documents received were as follows:

Document	*Version*	*Date*
Other [Cover email with new PI GCP Cerificate]		21 February 2018
Other [GCP for new PI G Arora]		20 February 2018

Approved documents

The final list of approved documentation for the study is therefore as follows:

Document	*Version*	*Date*
Copies of advertisement materials for research participants [SOHIPPP Poster]	1.1	12 July 2017
Covering letter on headed paper [Response to EoSRES]		
Covering letter on headed paper [Response to EoSRES]		
Covering letter on headed paper [Regarding new PI]		26 January 2018
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Co-Sponsorship Agreement]	4.0 280812	18 May 2017

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IRAS Checklist XML [Checklist_10082017]		10 August 2017
Letter from sponsor [Sponsorship letter & insurance note]		10 May 2017
Other [Reply slip]	1.0	24 April 2017
Other [PI CV G Arora]		
Other [GCP regisrtation Form for 20/2/2018]		
Other [Cover email with new PI GCP Cerificate]		21 February 2018
Other [GCP for new PI G Arora]		20 February 2018
Participant consent form [SOHIPP ICF (highlighted changes)]	1.3	10 August 2017
Participant information sheet (PIS) [PIS_dental survey (highlighted changes)]	1.3	10 August 2017
REC Application Form [REC_Form_12062017]		12 June 2017
Research protocol or project proposal [SOHIPP Survey - (highlighted changes)]	1.3	10 August 2017
Research protocol or project proposal [SOHIPP Survey]	1.3	10 August 2017
Summary CV for Chief Investigator (CI) [Ruth Freeman CV]		
Validated questionnaire [Dental examination]	1.0	25 January 2017
Validated questionnaire [Oral Health Questionnaire (tracked changes)]	1.2	04 August 2017

You should ensure that the sponsor has a copy of the final documentation for the study. It is the sponsor's responsibility to ensure that the documentation is made available to R&D offices at all participating sites.

17/ES/0083	**Please quote this number on all correspondence**

Yours sincerely

Arlene Grubb

Arlene Grubb
Assistant Co-ordinator

Email: eosres.tayside@nhs.net

East of Scotland Research Ethics Service (EoSRES)

NHS SCOTLAND
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Professor Ruth E. Freeman
Professor of Dental Public Health Research
Dental Health Services Research Unit,
University of Dundee
School of Dentistry
Park Place
Dundee
DD1 4HN

Date: 20 April 2018
Your Ref:
Our Ref: LR/AG17/ES/0083
Enquiries to: Arlene Grubb
Direct Line: 01382 383848
Email: eosres.tayside@nhs.net

Dear Professor Freeman

Study title:	**Scottish Oral Health Improvement Prison Programme (SOHIPP) Survey**
REC reference:	**17/ES/0083**
Protocol number:	**N/A**
Amendment number:	**AM01 (REC Reference only)**
Amendment date:	**19 April 2018**
IRAS project ID:	**229441**

Thank you for your letter of 19 April 2018, notifying the Committee of the above amendment.

The Committee does not consider this to be a "substantial amendment" as defined in the Standard Operating Procedures for Research Ethics Committees. The amendment does not therefore require an ethical opinion from the Committee and may be implemented immediately, provided that it does not affect the approval for the research given by the R&D office for the relevant NHS care organisation.

Documents received

The documents received were as follows:

Document	Version	Date
Notice of Non Substantial Amendment	AM01	19 April 2018
Email re; Survey Statistics		12 April 2018
Sponsor Approval		19 April 2018
Cover email		19 April 2018
Research protocol or project proposal [Tracked Changes]	1.4	19 April 2018

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Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

17/ES/0083:	Please quote this number on all correspondence

Yours sincerely

Arlene Grubb
Assistant Co-ordinator

Email: eosres.tayside@nhs.net

Copy to: TASC

disability confident EMPLOYER

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Professor Ruth E. Freeman
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Date: 25 June 2018
Your Ref:
Our Ref: LR/AG17/ES/0083
Enquiries to: Arlene Grubb
Direct Line: 01382 383848
Email: eosres.tayside@nhs.net

Dear Professor Freeman

Study title:	**Scottish Oral Health Improvement Prison Programme (SOHIPP) Survey**
REC reference:	**17/ES/0083**
Protocol number:	**N/A**
Amendment number:	**AM02 (REC Reference only)**
Amendment date:	**22 June 2018**
IRAS project ID:	**229441**

Thank you for your letter of 22 June 2018, notifying the Committee of the above amendment.

- An extension to study duration until 30/6/2019

The Committee does not consider this to be a "substantial amendment" as defined in the Standard Operating Procedures for Research Ethics Committees. The amendment does not therefore require an ethical opinion from the Committee and may be implemented immediately, provided that it does not affect the approval for the research given by the R&D office for the relevant NHS care organisation.

Documents received

The documents received were as follows:

Document	Version	Date
Notice of Non Substantial Amendment	AM02	22 June 2018
Sponsor approval		22 June 2018

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

disability confident EMPLOYER

17/ES/0083:	Please quote this number on all correspondence

Yours sincerely

Arlene Grubb
Assistant Co-ordinator

Email: eosres.tayside@nhs.net

Research and Development Support Unit
Ground Floor
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Professor Ruth Freeman
School of Dentistry – Dental Health
Services Research Unit
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DD2 4BF

Date: 5th April 2018
Our ref: JC/LMM/17/DGY/037

Study title: SOHIPP – Prison Oral Health Survey
Protocol version approved: v1.3 10/08/2017
Amendments included: NSA – 23.01.2018

Dear Professor Freeman

Thank you for sending me details of your study with a request for management approval. I can confirm that the study review team has reviewed the documentation and on this basis I am pleased to inform you that your study has management approval for commencement within NHS Dumfries and Galloway.

It is a condition of this approval that everyone involved in this study abides by the guidelines/protocols laid down by this Health Board in respect of confidentiality and Research Governance. It is your responsibility to ensure you are familiar with these; please do not hesitate to seek advice if you are unsure. Copies of Research Governance Framework documents are available via the website www.sehd.scot.nhs.uk/cso and then use the publications link.

We also note that it is the sponsor's responsibility to ensure that appropriate training is in place for all local investigators. It is important that all research must be carried out in compliance with the Research Governance Framework for Health and Community Care and the new EU Clinical Trials Directive (for clinical trials involving investigational medicinal products).

As part of the Health Board's responsibilities under Research Governance a sample of studies will be monitored, and it is therefore important that all records in connection with the study are kept up to date and available for review. We are also required to inform you that details of your study will be entered onto our R&D database. As custodian of the information collated during this research project, you are responsible for ensuring the security of all personal information collected, in line with NHS Scotland IT Security Policies, until the destruction of this data.

Research and Development Support Unit
Ground Floor
Dumfries and Galloway Royal Infirmary
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Dumfries
& Galloway

If your study is adopted by UKCRN into a portfolio then please advise this department of recruitment figures by adding accrual data to that database on a monthly basis.

Please notify the R&D office immediately you become aware of any serious adverse events associated with this research.

You must contact the R&D Department if/when the project is subject to any minor or substantial amendments so that these can be appropriately assessed, and approved, where necessary. I understand that performance of this study will not infringe on NHS Dumfries and Galloway's ability to deliver our usual level of service.

May I take this opportunity to wish you every success with your project. Please do not hesitate to seek help and advice from the R&D Support Unit (ext 33165/33815) if there is anything you feel you require assistance with. I look forward to hearing about your work and would appreciate a short annual report and a final report when the study is complete.

Yours Sincerely

Janie Candlish

Mrs Janie Candlish
Clinical Trials/Research Project Manager

cc: SREDA Database

NHS Forth Valley

Carseview House
Castle Business Park
Stirling
FK9 4SW

Telephone:
Fax:

NHS Forth Valley

Professor Ruth E Freeman
Professor of Dental Public Health Research
Dental Health Services Research Unit,
University of Dundee
School of Dentistry
Park Place
DUNDEE
DD1 4HN

Date 21 November 2018

Your Ref SU/ig
Our Ref
Enquiries to Direct line: 01324 214690
Email: FV-UHB.RandD-depart@nhs.net
R&D ref FV1045

Dear Professor Freeman

Study title: Scottish Oral Health Improvement Prison Programme (SOHIPP) Survey
REC reference: 17/ES/0083

Following the favourable opinion from the East of Scotland Research Ethics Service on 11 August 2017, and the clinical trial agreement between NHS Forth Valley, the University of Dundee and NHS Tayside, signed by myself on 21 November 2018 I am pleased to confirm that I formally gave Management Approval to the study above on 21 November 2018. This approval is subject to the following conditions:

- Provision of a suitable Letter of Access for Garima Arora

This approval is granted subject to your compliance with the following:

1. Any amendments to the protocol or research team must have Ethics Committee and R&D approval (as well as approval from any other relevant regulatory organisation) before they can be implemented. Please ensure that the R&D Office and (where appropriate) NRS are informed of any amendments as soon as you become aware of them.

2. You and any local Principal Investigator are responsible for ensuring that all members of the research team have the appropriate experience and training, including GCP training if required.

3. If someone working within NHS Forth Valley is recruiting participants, those figures **MUST** be recorded on the EDGE research management system. If you have not used EDGE before, you should already have been offered training on the system. If recruitment is all being handled outside Forth Valley, you will be contacted monthly for the latest recruitment figures.

4. All those involved in the project will be required to work within accepted guidelines of health and safety and data protection principles, any other relevant statutory legislation, UK Policy Framework for Health and Social Care Research and IHC-GCP guidelines. A copy of the Framework can be accessed at: http://www.nhsresearchscotland.org.uk/uploads/tinymce/uk-policy-framework-health-social-care-research%20v1.1.pdf and ICH-GCP guidelines may be found at http://www.ich.org/LOB/media/MEDIA482.pdf

NHS
Forth Valley

4. As custodian of the information collected during this project you are responsible for ensuring the security of all personal information collected in line with NHS Scotland IT security policies, until the destruction of this data.

5. You or the local Principal Investigator will be required to provide the following reports and information during the course of your study:

- A progress report **annually**
- Report on SAEs and SUSARs if your study is a Clinical Trial of an Investigational Medicinal Product
- Any information required for the purpose of internal or external audit and monitoring
- Copies of any external monitoring reports
- Notification of the end of recruitment and the end of the study
- A copy of the final report, when available.
- Copies of or full citations for any publications or abstracts

The appropriate forms will be provided to you by the Research and Development office when they are needed. Other information may be required from time to time.

Yours sincerely

pp Scott Lynch

Andrew Murray
Medical Director

c.c. g.arora@dundee.ac.uk
Lesley.yeaman@nhs.net

Research and Development

Foresterhill House Annexe
Foresterhill
ABERDEEN
AB25 2ZB

NHS Grampian

Mrs Garima Arora
School of Dentistry
Dental Health Services Research Unit
Level 9
Park Place
DUNDEE
DD2 4BF

Date	01/06/2018
(Re-issue)	05/06/2018
Project No	2017MD001
Enquiries to	Lynn Massie
Extension	53846
Direct Line	01224 553846
Email	grampian.randdpermissions@nhs.net

Dear Mrs Arora

Management Permission for Non-Commercial Research

STUDY TITLE: SOHIPP: Prison Oral Health Survey
PROTOCOL NO: V1.4; 19.4.18
REC REF: 17/ES/0083
NRS REF: NRS17/229441

Thank you very much for sending all relevant documentation. I am pleased to confirm that the project is now registered with the NHS Grampian Research & Development Office. The project now has R & D Management Permission to proceed locally. This is based on the documents received from yourself and the relevant Approvals being in place.

All research with an NHS element is subject to the Research Governance Framework for Health and Community Care (2006, 2nd edition), and as Chief or Principal Investigator you should be fully committed to your responsibilities associated with this.

R&D Permission is granted on condition that:

1) **The R&D Office will be notified and any relevant documents forwarded to us if any of the following occur:**
   - **Any Serious Breaches in Grampian (Please forward to pharmaco@abdn.ac.uk).**
   - **A change of Principal Investigator in Grampian or Chief Investigator.**
   - **Any change to funding or any additional funding**

2) **The R&D Office will be notified when the study ends.**

3) **The Sponsor will notify all amendments to the relevant National Co-ordinating centre. For single centre studies, amendments should be notified to the R&D office directly.**

We hope the project goes well, and if you need any help or advice relating to your R&D Management Permission, please do not hesitate to contact the office.

Yours sincerely

Susan Ridge
Non-Commercial Manager

cc: CI – Prof Ruth Freeman
Brian Dawson, NHS Grampian
Research Monitor

Sponsor:
NHS Tayside
University of Dundee

Professor Angus Watson
Research, Development & Innovation Director
Research, Development & Innovation Division
NHS Highland
Centre for Health Science
Old Perth Road
Inverness
IV2 3JH

Tel: 01463 255822
Fax: 01463 255838
E-mail: angus.watson@nhs.net

06 June 2018

NHS Highland R&D ID: **Highland 1348**
NRSPCC ID: **NRS17/229441**

Garima Arora
Research Assistant – SOHIPP
9th Floor, Dundee Dental Hospital and School
University of Dundee
Park Place
Dundee
DD1 4HN

Dear Ms Arora,

Management Approval for Non-Commercial Research

I am pleased to tell you that you now have Management Approval for the research project entitled: **'SOHIPP: Prison Oral Health Survey'. [Protocol V1.4 19.4.18].** I acknowledge that:

- The project is sponsored by the University of Dundee.
- The project is funded by the NHS Forth Valley.
- Research Ethics approval for the project has been obtained from the North of Scotland Research Ethics Committee (Reference Number: 17/ES/0083).
- The project is Site-Specific Assessment exempt.

The following conditions apply:

- The responsibility for monitoring and auditing this project lies with the University of Dundee.
- This study will be subject to ongoing monitoring for Research Governance purposes and may be audited to ensure compliance with the Research Governance

Framework for Health and Community Care in Scotland (2006, 2nd Edition), however prior written notice of audit will be given.

- Any researchers coming into NHS Highland for the purposes of carrying out research with patients will require the submission of a Research Passport, Occupational Health approval and Letter of Access before starting the study at this site. Please contact Anna McIver (anna.mciver@nhs.net) for further assistance, if this is required
- You are reminded that all amendments (minor or substantial) to the protocol and associated study documents or to the REC application should be copied to the NHS Highland Research and Development Office together with a copy of the corresponding approval letter. Guidance can be found at https://www.nhsresearchscotland.org.uk/services/permissions-co-ordinating-centre/permissions
- The paperwork concerning all incidents, adverse events and serious adverse events, if thought to be attributable to participant's involvement in this project, and appropriate to the study, should be copied to the NHS Highland R&D Office. Please email documents to Anna McIver, RD&I Facilitator (anna.mciver@nhs.net).
- If applicable, monthly recruitment rates should be notified to the NHS Highland Research and Development Office, detailing date of recruitment and the participant trial ID number. This should be done by e-mail on the first week of the following month, to Debbie McDonald, RD&I Data Manager (debbie.mcdonald@nhs.net).
- Please report any other changes in resources used, or staff involved in the project, to the NHS Highland Research and Development Manager, Frances Hines (01463 255822, frances.hines@nhs.net).

Please quote your RD&I Highland reference number (Highland 1348).

Yours sincerely,

Frances Hines

Frances Hines
RD&I Manager

cc Frances Hines, R&D Manager, NHS Highland Research, Development & Innovation Division, Phase 3, The Centre for Health Science, Old Perth Road, Inverness, IV2 3JH

Professor Ruth E. Freeman
Dental Health Services Research Unit
University of Dundee
School of Dentistry
Park Place
Dundee

R&D Department
Corporate Services Building
Monklands Hospital
Monkscourt Avenue
AIRDRIE
ML6 0JS

Date 25.09.18
Enquiries to Elizabeth McGonigal, R&D Facilitator
Direct Line 01236 712459
Email elizabeth.mcgonigal@lanarkshire.scot.nhs.uk

Dear Professor Freeman

Project title: SOHIPP: Prison Oral Health Survey

R&D ID: L17070

NRS ID Number: NRS17/229441

I am writing to you as Chief Investigator of the above study to advise that R&D Management approval has been granted for the conduct of your study within NHS Lanarkshire as detailed below:

NAME	TITLE	ROLE	NHSL SITE TO WHICH APPROVAL APPLIES
Joanna Morrison	Public Dental Officer	Local Collaborator	HMP Shotts

For the study to be carried out you are subject to the following conditions:

Conditions

- You are required to comply with Good Clinical Practice, Ethics Guidelines, Health & Safety Act 1999 and relevant UK and EU Data Protection legislation.
- The research is carried out in accordance with the Scottish Executive's Research Governance Framework for Health and Community Care (copy available via the Chief Scientist Office website: http://www.cso.scot.nhs.uk/ or the Research & Development Intranet site: http://firstport2/staff-support/research-and-development/default.aspx

- You must ensure that all confidential information is maintained in secure storage. You are further obligated under this agreement to report to the NHS Lanarkshire Data Protection Office and the Research & Development Office infringements, either by accident or otherwise, which constitutes a breach of confidentiality.
- Clinical trial agreements (if applicable), or any other agreements in relation to the study, have been signed off by all relevant signatories.
- You must contact the Lead Nation Coordinating Centre if/when the project is subject to any minor or substantial amendments so that these can be appropriately assessed, and approved, where necessary.
- You notify the R&D Department if any additional researchers become involved in the project within NHS Lanarkshire
- You notify the R&D Department when you have completed your research, or if you decide to terminate it prematurely.
- You must send brief annual reports followed by a final report and summary to the R&D office in hard copy and electronic formats as well as any publications.
- If the research involves any investigators who are not employed by NHS Lanarkshire, but who will be dealing with NHS Lanarkshire patients, there may be a requirement for an SCRO check and occupational health assessment. If this is the case then please contact the R&D Department to make arrangements for this to be undertaken and an honorary contract issued.

I trust these conditions are acceptable to you.

Yours sincerely,

Raymond Hamill – Senior R&D Manager

cc.

NAME	TITLE	CONTACT ADDRESS	ROLE
Joanna Morrison	Public Dental Officer	Joanna.Morrison@lanarkshire.scot.nhs.uk	Local Collaborator
Dr Vera Feruza Nuritova		f.nuritova@dundee.ac.uk	Sponsor Contact
Margaret French	Locality Manager	Margaret.French2@lanarkshire.scot.nhs.uk	Other
Gillian Henderson	Senior Nurse, Shotts	Gillian.Henderson@lanarkshire.scot.nhs.uk	Other
Anne Moore	Clinical Director PDS	Anne.Moore@lanarkshire.scot.nhs.uk	Other

University Hospitals Division

NHS Lothian

Queen's Medical Research Institute
47 Little France Crescent, Edinburgh, EH16 4TJ

DY/CK approval

12 November 2018

Mrs Garima Arora
Dental Health Services Research Unit
Level 9, DHSRU, School of Dentistry
Park Place
Dundee
DD14HN

Research & Development
Room E1.16
Tel: 0131 242 3330

Email:
accord@nhslothian.scot.nhs.uk

Director: Professor Tim Walsh

Dear Mrs Arora

Lothian R&D Project No: 2018/0158 **REC No:** 17/ES/0083

Title of Research: SOHIPP: Prison Oral Health Survey

Participant Information Sheet:
Version 1.3, dated 10 August 2017

Consent Form:
Version 1.3, dated 10 August 2017

Protocol: Version 1.4; dated 19 April 2018

I am pleased to inform you this letter provides Site Specific approval for NHS Lothian for the above study and you may proceed with your research, subject to the conditions below.

Please note that the NHS Lothian R&D Office must be informed of any changes to the study such as amendments to the protocol, funding, recruitment, personnel or resource input required of NHS Lothian.

Substantial amendments to the protocol will require approval from the ethics committee which approved your study and the MHRA where applicable.

Please keep this office informed of the following study information, **which is a condition of NHS Lothian R&D Management Approval**:

1. Date you are ready to begin recruitment, date of the recruitment of the first participant and the monthly recruitment figures thereafter.
2. Date the final participant is recruited and the final recruitment figures.
3. Date your study / trial is completed within NHS Lothian.

I wish you every success with your study.

Yours sincerely

Dr Douglas Young
Principal R&D Manager

CC - Andrew Mulford – Dentist, HMP Edinburgh

STA034

15 August 2017

Professor Ruth Freeman
Professor of Dental Public Health Research
Dental Health Services Research Unit
The Mackenzie Building
Kirsty Semple Way
Dundee
DD2 4BF

Dear Professor Freeman,

R&D MANAGEMENT APPROVAL – TAYSIDE

Title: SOHIPP: Prison Oral Health Survey

Chief Investigator: Professor Ruth Freeman

Principal Investigator/Local Collaborator: Ms Nadja Almondes

Tayside Ref: 2017DE02 **NRS Ref: NRS17/229441**

REC Ref: 17/ES/0083

Sponsor: NHS Tayside and University of Dundee

Funder: NHS Forth Valley

Many thanks for your application to carry out the above project here in NHS Tayside. I am pleased to confirm that the project documentation (as outlined below) has been reviewed, registered and Management Approval has been granted for the study to proceed locally in Tayside.

Approval is granted on the following conditions:-

- ALL Research must be carried out in compliance with the Research Governance Framework for Health & Community Care, Health & Safety Regulations, data protection principles, statutory legislation and in accordance with Good Clinical Practice (GCP).
- All amendments to be notified to TASC R&D Office via the correct amendment pathway. Either direct to the R&D Office or via the Lead Co-ordinating Centre depending on how the study is set up (http://www.hra.nhs.uk/nhshsc-rd-uk-process-management-amendments/).
- All local researchers must hold either a Substantive Contract, Honorary Research Contract, Honorary Clinical Contract or Letter of Access with NHS Tayside where required (http://www.nihr.ac.uk/about-us/CCF/policy-and-standards/research-passports.htm).
- TASC R&D Office to be informed of change in Principal Investigator, Chief Investigator or any additional research personnel locally.
- Notification to TASC R&D Office of any change in funding.

- As custodian of the information collated during this research project you are responsible for ensuring the security of all personal information collected in line with NHS Scotland IT Security Policies, until destruction of this data.

- All eligible and adopted studies will be added to the Central Portfolio Management System (CPMS). Recruitment figures for eligible and adopted studies must be recorded onto the Portfolio every month. This is the responsibility of the lead UK site. If you are the lead, or only UK site, we can provide help or advice with this. For information, contact Sarah Kennedy (01382 383882 or sarah.kennedy17@nhs.net) or Laura Stephen (01382 383985 or laura.stephen2@nhs.net).

- Annual reports are required to be submitted to TASC R&D Office with the first report due 12 months from date of issue of this management approval letter and at yearly intervals until completion of the study.

- Notification of early termination within 15 days or End of Trial within 90 days followed by End of Trial Report within 1 year to TASC R&D Office.

- You may be required to assist with and provide information in regard to audit and monitoring of study.

Please note you are required to adhere to the conditions, if not, NHS management approval may be withdrawn for the study.

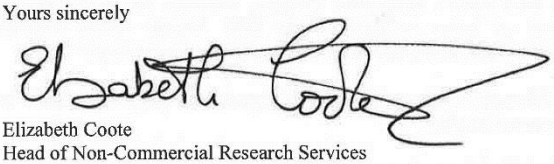
Approved Documents

Document	Version	Date
Copies of advertisement materials for research participants [SOHIPP Poster]	**1.1**	**12 July 2017**
Evidence of Sponsor insurance or indemnity (non NHS Sponsors only) [Co-Sponsorship Agreement]	**4.0 280812**	**18 May 2017**
Letter from sponsor [Sponsorship letter & insurance note]		**10 May 2017**
Other [Reply slip]	**1.0**	**24 April 2017**
Participant consent form [SOHIPP ICF (Highlighted changes)]	**1.3**	**10 August 2017**
Research protocol or project proposal [SOHIPP Survey – (highlighted changes)]	**1.3**	**10 August 2017**
Participant information sheet (PIS) [PIS_dental survey (highlighted changes)]	**1.3**	**10 August 2017**
Validated questionnaire [Dental examination]	**1.0**	**25 January 2017**
Validated questionnaire [Oral Health Questionnaire (tracked changes)]	**1.2**	**04 August 2017**

May I take this opportunity to wish you every success with your project.

Please do not hesitate to contact TASC R&D Office should you require further assistance.

Yours sincerely



Elizabeth Coote
Head of Non-Commercial Research Services

TAyside medical Science Centre (TASC)
Ninewells Hospital & Medical School

TASC Research & Development Office
Residency Block, Level 3
George Pirie Way
Dundee DD1 9SY
Email: liz.coote@nhs.net
Tel: 01382 383876 Fax: 01382 740122

C.c. Nadja Almondes
Nikki Gribben
NRSPCC

Appendix 2: Oral Health Survey Questionnaire

The Scottish Oral Health Improvement Prison Programme

A Survey of Prisoners' Oral Health

SOHIPP University of Dundee SPS Scottish Prison Service

NHS Dumfries & Galloway NHS Forth Valley NHS Grampian NHS Highland NHS Lanarkshire NHS Lothian NHS Tayside

GUIDE FOR COMPLETING THE FORM

Please read the following guide before completing the questionnaire.

1. Please complete all pages of the survey using **Black** or **Blue** ink. Please do not use pencil.

2. **Check boxes:** You may use ticks, crosses, dots, lines or squiggles to mark your response to the questions.

3. **Correcting errors:** If you make a mistake or want to change your answer, please score out your first response and clearly mark your preferred response, i.e. enter a large X in the wrong answer and a tick in the correct one.

4. **Text Boxes:** Please write as clearly as you can, keeping all text within the box provided.

5. Participants should only complete sections 1,2 and 3 of the questionnaire and take their questionnaire to the dental examiner who will fill in section 4.

Participant Study ID: ☐☐☐☐☐ Today's date: ☐☐ ☐☐ ☐☐

Prison Code: ☐

Please note that you do not have to answer any questions that you do not want to.

1. ABOUT YOU

Gender: ☐ Male ☐ Female Date of Birth: ☐☐ ☐☐ ☐☐ DD MM YY

Ethnic origin: ☐ Prefer not to say ☐ Black, Black British, Black Scottish

☐ White ☐ Asian, Asian British, Asian Scottish

☐ Mixed ☐ Other: ☐

First language if not English: ☐ ☐ Prefer not to say

What age were you when you left school? ☐ years ☐ Prefer not to say

Before coming into prison this time were you:

☐ Unemployed ☐ Training (apprentice/trainee)

☐ Employed full-time ☐ Full-time education

☐ Employed part-time ☐ Part time education

☐ Prefer not to say

Occupation/ previous occupation: ☐

☐ Prefer not to say

Marital status: ☐ Single ☐ Married/cohabiting

☐ Separated/divorced/widowed ☐ Prefer not to say

Do you have any children? ☐ Yes ☐ No ☐ Prefer not to say

If Yes how many children ☐ ☐ Prefer not to say

Was/were your children living with you before prison? ☐ Yes ☐ No ☐ Prefer not to say

Previous living status

As a child/teenager were you ever in a children's institution or home?

☐ Yes ☐ No ☐ Prefer not to say

As a child/teenager were you ever in foster care?

☐ Yes ☐ No ☐ Prefer not to say

Before coming to prison where did you live (stay)?

- ☐ Own property
- ☐ With parents or family
- ☐ Rented (tied) accommodation
- ☐ With friends (e.g., sofa surfer)
- ☐ B&B
- ☐ Temporary accommodation, e.g., Hostel or half way- house
- ☐ Children's institution or home
- ☐ Prefer not to say

Homelessness is defined as a period when you may have stayed with friends or a family member because you had nowhere else to go, stayed in a hostel or B&B, on the streets or in another location such as a squat, a car or any other place you did not consider home.

Have you ever been homeless? ☐ Yes ☐ No ☐ Prefer not to say

If yes, how long had you been homeless

- ☐ Less than 6 months
- ☐ 1 to less than 2 years
- ☐ 6 to under 12 months
- ☐ More than 2 years
- ☐ Prefer not to say

How long ago did you begin your prison sentence? ☐ Years ☐ Months ☐ Prefer not to say

How many times have you been in prison? ☐ Remand ☐ Sentenced ☐ Prefer not to say

How long is your current stay in prison? ☐ Less than 4 years ☐ More than 4 years ☐ Prefer not to say

2. CONFIDENTIAL MEDICAL HISTORY

	Yes	No	Don't know	Prefer not to say
Are you receiving treatment from a doctor, hospital, clinic or specialist?	☐	☐	☐	☐
Are you taking or using any medicine, pills, syrups, ointments, puffers or injectors prescribed for you by a doctor? If yes, please list below:	☐	☐	☐	☐
Have you had angina?	☐	☐	☐	☐
Have you had blood pressure problems?	☐	☐	☐	☐
Have you had a heart attack?	☐	☐	☐	☐
Do you suffer from any infectious disease, e.g. HIV, hepatitis?	☐	☐	☐	☐
Do you have asthma or any other lung disease?	☐	☐	☐	☐

	Yes	No	Don't know	Prefer not to say
Do you have epilepsy?	☐	☐	☐	☐
Do you have diabetes?	☐	☐	☐	☐
Do you bruise or bleed easily?	☐	☐	☐	☐
Are you allergic to any medicine, foods, or materials?	☐	☐	☐	☐
Are you pregnant? (if applicable)	☐	☐	☐	☐
Do you chew tobacco?	☐	☐	☐	☐
Are there any other details you feel we should know about your medical history?	☐	☐	☐	☐

	Yes	No	Prefer not to say
Have you ever used (illegal) drugs?	☐	☐	☐
Have you ever used intravenous drugs?	☐	☐	☐
Do you smoke cigarettes/ roll-ups?	☐	☐	☐
If yes, how many per day?			
Have you taken part in drug treatment (rehab) programme?	☐	☐	☐

Please note that you do not have to answer any questions that you do not want to.

	Not anxious	Slightly anxious	Fairly anxious	Very anxious	Extremely anxious
If you went to your dentist for TREATMENT TOMORROW, how would you feel?	☐	☐	☐	☐	☐
If you were sitting in the WAITING ROOM (waiting for treatment), how would you feel?	☐	☐	☐	☐	☐
If you were to have your TEETH DRILLED, how would you feel?	☐	☐	☐	☐	☐
If you were about to have your TEETH SCALED AND POLISHED, how would you feel?	☐	☐	☐	☐	☐
If you were about to have a LOCAL ANAESTHETIC INJECTION in your gum, above an upper back tooth, how would you feel?	☐	☐	☐	☐	☐

Please note that you do not have to answer any questions that you do not want to.

In the last 12 months:	Never	Hardly ever	Occasionally	Fairly often	Very often
Have you ever had trouble pronouncing any words because of problems with your teeth, mouth or dentures?	☐	☐	☐	☐	☐
Have you ever felt your sense of taste has worsened because of problems with your teeth, mouth or dentures?	☐	☐	☐	☐	☐
Have you had painful aching in your mouth?	☐	☐	☐	☐	☐
Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth or dentures?	☐	☐	☐	☐	☐
Have you been self-conscious because of your teeth, mouth or dentures?	☐	☐	☐	☐	☐
Have you felt tense because of problems with your teeth, mouth or dentures?	☐	☐	☐	☐	☐
Has your diet been unsatisfactory because of problems with your teeth, mouth or dentures?	☐	☐	☐	☐	☐
Have you had to interrupt meals because of problems with your teeth, mouth or dentures?	☐	☐	☐	☐	☐
Have you found it difficult to relax because of problems with your teeth, mouth or dentures?	☐	☐	☐	☐	☐
Have you been a bit embarrassed because of your teeth, mouth or dentures?	☐	☐	☐	☐	☐
In the last 12 months:	**Never**	**Hardly ever**	**Occasionally**	**Fairly often**	**Very often**
Have you been a bit irritable with other people because of problems with your teeth, mouth or dentures?	☐	☐	☐	☐	☐
Have you had difficulties doing your usual jobs because of problems with your teeth, mouth or dentures?	☐	☐	☐	☐	☐
Have you felt that life in general was less satisfying because of problems with your teeth, mouth or dentures?	☐	☐	☐	☐	☐
Have you been totally unable to function because of problems with your teeth, mouth or dentures?	☐	☐	☐	☐	☐

Please note that you do not have to answer any questions that you do not want to.

In the last week:	Rarely or none of the time (less than 1 day)	Some or little of the time (1-2 days)	Occasionally or a moderate amount of the time (3-4 days)	Most or all of the time (5-7 days)
I was bothered by things that usually don't bother me	☐	☐	☐	☐
I did not feel like eating; my appetite was poor	☐	☐	☐	☐
I felt that I could not shake off the blues even with help from my family or friends	☐	☐	☐	☐
I felt I was just as good as other people	☐	☐	☐	☐
I had trouble keeping my mind on what I was doing	☐	☐	☐	☐
I felt depressed	☐	☐	☐	☐
I felt that everything I did was an effort	☐	☐	☐	☐
I felt hopeful about the future	☐	☐	☐	☐
I thought my life had been a failure	☐	☐	☐	☐
I felt fearful	☐	☐	☐	☐
My sleep was restless	☐	☐	☐	☐
I was happy	☐	☐	☐	☐
I talked less than usual	☐	☐	☐	☐
I felt lonely	☐	☐	☐	☐
People were unfriendly	☐	☐	☐	☐
I enjoyed life	☐	☐	☐	☐
I had crying spells	☐	☐	☐	☐
I felt sad	☐	☐	☐	☐
I felt that people dislike me	☐	☐	☐	☐
I could not get "going"	☐	☐	☐	☐

3. ORAL HEALTH AND DENTAL TREATMENT

How long ago was your last visit to a dentist (in or out of prison)?

☐ Less than 6 months ago ☐ 6 months to 1 year ago ☐ More than 1 year, up to 2 years ago

☐ More than 2 years, up to 5 years ago ☐ More than 5 years ago ☐ Never been to a dentist

Last time you went to a dentist, what made you go?

☐ Trouble with teeth or gums ☐ I went for a check-up ☐ I can't remember

☐ Other reason: _____

At the dentist have you ever had:	Yes	No	Don't Know		Yes	No	Don't Know
Fillings	☐	☐	☐	Fissure sealant (coating applied to tooth)	☐	☐	☐
An injection in your gum	☐	☐	☐	General anaesthetic (gas)	☐	☐	☐
An injection in your arm	☐	☐	☐	An abscess	☐	☐	☐
X-rays	☐	☐	☐	Bridge work	☐	☐	☐
Extractions	☐	☐	☐	A scale and polish	☐	☐	☐
Laughing gas (RA)	☐	☐	☐	Dentures	☐	☐	☐
Fluoride treatments	☐	☐	☐	Crowns	☐	☐	☐

Thinking about going to the dentist:	Definitely feel like that	To some extent	Don't know	Don't feel like that
If I had toothache I'd rather take painkillers than go to the dentist	☐	☐	☐	☐
The worst part of going to the dentist is waiting	☐	☐	☐	☐
Going to the dentist is like being processed on a conveyor belt	☐	☐	☐	☐
I'd like to know more about what the dentist is going to do and why	☐	☐	☐	☐
I don't like fancy (intricate) dental treatment	☐	☐	☐	☐
I don't like lying flat in the dental chair	☐	☐	☐	☐
I find NHS dental treatment difficult to find outside of prison	☐	☐	☐	☐

If you went to a dentist with an aching back tooth would you prefer to have it taken out (extracted) or filled (supposing it could be filled)? ☐ Filled ☐ Taken out

If a dentist said that a front tooth would have to be taken out (extracted) or capped (crowned), what would you prefer? ☐ Crowned ☐ Taken out

Which of the following do you do daily to improve your oral health? (Please tick all boxes that apply to you)	**Home**	**Prison**
Clean my teeth with a tooth brush and fluoride toothpaste	☐	☐
Don't eat or drink sugary foods and drinks between meals	☐	☐
Clean my dentures ☐ No dentures worn	☐	☐
Leave my dentures out at night ☐ No dentures worn	☐	☐

Have you ever attended the prison dentist? ☐ Yes ☐ No

What do you think about visiting the prison dentist? (Please tick all boxes that apply to you)

☐ The dentist is not here enough
☐ It is difficult to get an appointment
☐ I don't like the dentist here
☐ I have not been able to get the request form
☐ I find it difficult to complete the request form
☐ Other reason:

If other reason, please explain?

IF YOU HAVE LOST SOME, OR ALL OF YOUR NATURAL TEETH, WE WOULD LIKE YOU TO ANSWER THE FOLLOWING QUESTIONS

Have you ever had any kind of denture? ☐ Yes ☐ No

If YES, what type of denture do you have?	Yes	No		Yes	No	Sometimes
Full TOP denture	☐	☐	Do you wear it?	☐	☐	☐
Full BOTTOM denture	☐	☐	Do you wear it?	☐	☐	☐
TOP part denture	☐	☐	Do you wear it?	☐	☐	☐
BOTTOM part denture	☐	☐	Do you wear it?	☐	☐	☐

If there is anything else you want to tell us about your mouth/teeth/dentures, or going to the dentist, please use the box below

THANK YOU

If you would like to talk about any part of this survey, or any aspects of your dental health, please contact the Health Care Team in your prison.

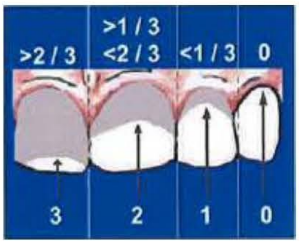
The rest of this questionnaire should be completed by the clinical research team

4. ORAL HEALTH EXAMINATION

Oral Mucosa	No Lesion	Lesion (Monitor)	Lesion (Refer)
Lips	☐	☐	☐
Buccal Mucosa	☐	☐	☐
Tongue	☐	☐	☐
Floor Mouth	☐	☐	☐
Palate	☐	☐	☐
Fauces	☐	☐	☐

Plaque Score

Plaque coverage:



UR6 ☐	UR1 ☐	UL6 ☐
☐ LR6	☐ LL1	☐ LL6

Dentures
Is there a denture present in the mouth? ☐ Yes ☐ No

IF YES:

Is the denture upper, lower or both? ☐ Upper only ☐ Lower only ☐ Both upper and lower

IF UPPER OR BOTH:

What is the upper denture type? ☐ Part Full ☐ Complete ☐ Implant

What is the upper denture base? ☐ Metal ☐ Plastic

What is the upper denture support? ☐ Tooth borne ☐ Tissue borne ☐ Both

What is the status of the upper denture? ☐ Intact ☐ Repair

IF LOWER OR BOTH:

What is the lower denture type? ☐ Part Full ☐ Complete ☐ Implant

What is the lower denture base material? ☐ Metal ☐ Plastic

What is the lower denture support? ☐ Tooth borne ☐ Tissue borne ☐ Both

What is the status of the lower denture? ☐ Intact ☐ Repair

SOHIPP Oral Health Survey: CRIB Sheet

Restoration and Sealant Codes		Caries Codes		Missing Teeth		Root Caries	
Code	**Description**	**Code**	**Description**	**Code**	**Description**	**Code**	**Description**
0	Not sealed or restored	0	Sound tooth surface	97	Tooth extracted as a result of caries	E	If the root surface cannot be visualized directly as a result of gingival recession or by gentle air-drying, then it is excluded, and not routinely coded.
1	Sealant, partial	1	First visual change in the enamel	98	Tooth missing for other reasons	0	The root surface does not exhibit any unusual discoloration that distinguishes it from the surrounding or adjacent root areas nor does it exhibit a surface defect either at the cemento–enamel junction or wholly on the root surface. The root surface has a natural anatomical contour, or the root surface might exhibit a definite loss of surface continuity or anatomical contour that is not consistent with the dental caries process. This loss of surface integrity usually is associated with dietary influences or habits such as abrasion or erosion.
2	Sealant, full	2	Distinct change in the enamel	99	Unerupted	1	There is a clearly demarcated area on the root surface or at the cemento–enamel junction that is discoloured (light/dark brown, black) but there is no cavitation (loss of anatomical contour <0.5 mm) present.
3	Tooth coloured restoration	3	Enamel breakdown, no dentine visible	P	Implant	2	There is a clearly demarcated area on the root surface or at the cemento–enamel junction that is discoloured (light/dark brown).
4	Amalgam restoration	4	Underlying dentinal shadow (not cavitated into dentine)				
5	Stainless steel crown	5	Distinct cavity with visible dentine				
6	Porcelain, gold, PFM crown or veneer	6	Extensive distinct cavity with visible dentine				
7	Lost or broken restoration						
8	Temporary restoration						

ICDAS Chart

Participant Study ID:

If there is anything else you want to tell us about your patient's mouth/teeth/dentures, or dental attendance, please use the box below.

THANK YOU

If you would like to talk about any part of this survey, please contact the Research Team. Please return this form as previously instructed.

Prison Oral Health Survey Questionnaire V1.3 04/07/2018
Dental Examination form V1.0 25/01/2017
Cover Art: Self-Portrait with Toothache. Michael, HM Prison Grendon. Courtesy of the Koestler Trust.

Appendix 3: Survey Training Documents

1. Content of the training days
2. Slide presentations

1. Content of the SOHIPP Oral Health Assessment Training Days

SOHIPP: Oral Health Assessment Training Day

Almond Room, Dundee Dental Education Centre

Wednesday 2nd May 2018

PROGRAMME

09.45	**Arrival and registration**	
10.00	Welcome and introductions	*Jacky Burns*
10.10	Oral Health Assessment in SOHIPP- ICDAS and data collection forms	*Jacky Burns*
10.40	Applying ICDAS in epidemiological studies	*Patrick Fee*
11.00	Using Data Collection Sheets	*Workshop session- all participants*
12.00	**Lunch Break**	
13:00	Overview of the Prison Survey	*Ruth Freeman*
13.15	Understanding SOHIPP Study procedures	*Derek Richards*
13.45	Role of the study researcher	*Garima Arora*
14.05	Conducting epidemiological studies in a prison setting	*Discussion- all participants*
14.35	Concluding remarks	*Jacky Burns*
14.45	Close	

SOHIPP: Oral Health Assessment Training Day

NHS Forth Valley Board Room, Stirling

Thursday 3rd May 2018

PROGRAMME

09.45	**Arrival and registration**	
10.00	Welcome and introductions	*Jacky Burns*
10.10	Oral Health Assessment in SOHIPP- ICDAS and data collection forms	*Jacky Burns*
10.40	Applying ICDAS in epidemiological studies	*Mark Robertson*
11.00	Using Data Collection Sheets	*Workshop session- all participants*
12.00	**Lunch Break**	
13:00	Overview of the Prison Survey	*Ruth Freeman*
13.15	Understanding SOHIPP Study procedures	*Derek Richards*
13.45	Role of the study researcher	*Garima Arora*
14.05	Conducting epidemiological studies in a prison setting	*Discussion- all participants*
14.35	Concluding remarks	*Jacky Burns*
14.45	Close	

2. Slide presentations

Role of the study Researcher

Garima Arora
Research Assistant
SOHIPP Programme
Dental Health Services Research Unit, University of Dundee

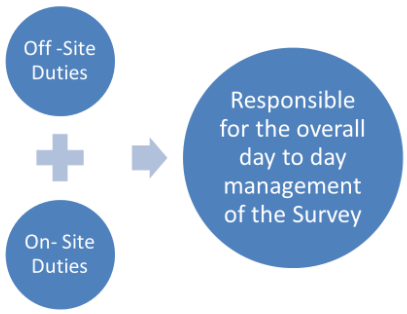
SOHIPP: Prison Oral Health Survey
Research Staff

Chief Investigator: Prof. Ruth Freeman
Professor of Dental Public Health Research, Hon Consultant in DPH NHS Tayside

Co-Investigator: Derek Richards
Consultant in Dental Public Health, NHS Forth Valley

Principal Investigator: Garima Arora
Research Assistant, SOHIPP Programme University of Dundee

SOHIPP University of Dundee



Off Site Duties
Fieldwork Preparation

1) Ethics

- Approvals: REC and NHS R&D Offices
- Amendments
- Maintenance of Study Master File

2) Researcher/ Examiner Training

- Researcher Good Clinical Practice Training
- Organisation of dedicated training session for SOHIPP Oral Health Survey: Examiners and Researcher
- Enhanced Disclosure, Research Passport, Letter of Access: Researcher

3) Liaising with the participating NHS Health Boards for study related updates.

4) Liaising with the prison healthcare management and oral health promoters prior to the survey dates.

4) Coordination of the Field Work/ data collection.

5) Preparation of survey equipment- Participant packs, posters and examination instruments.

On Site Duties
During Field work

1) Working along with the Examination Team in the administration of the survey on site.
2) Assisting participants with the written informed consent.
3) Assisting the participants in completion of the form: either in the form of interview or assistance by reading out the questions in order to facilitate self-completion of the form where ever required.
4) Collection of questionnaire data.
5) Responsible for referring participants suffering from depression highlighted though CES-D (Centre for Epidemiologic Studies Depression) scale in the questionnaire to the Prison Mental Health Service.
6) Responsible for maintaining participant confidentiality at stages.

Application of questionnaire in the prison setting

Posters advertising the survey + reply slips will be kept in the prison halls 1 week prior to data collection.

During this time, the oral health promoters, following their regular schedules, will discuss the project with the prisoners.

Prisoners who are interested will be provided with Participant Information Sheet (PIS) by the prison staff.

Obtaining consent- On the day of the oral examination and survey, interested prisoners will again be informed of the study and asked to provide written consent. The consent procedure will be conducted by oral health promoters, dentists who normally work in prison and previously agreed to help with the study, or members of the research team

Questionnaire completion - members of the research team will administer the questionnaire which will be completed by the prisoners themselves in a common room (prison halls or health centre waiting rooms), and the research team will be there to assist them in the completion.

Oral Health Examination- conducted by NHS trained dentists

Time allocation (approximate)

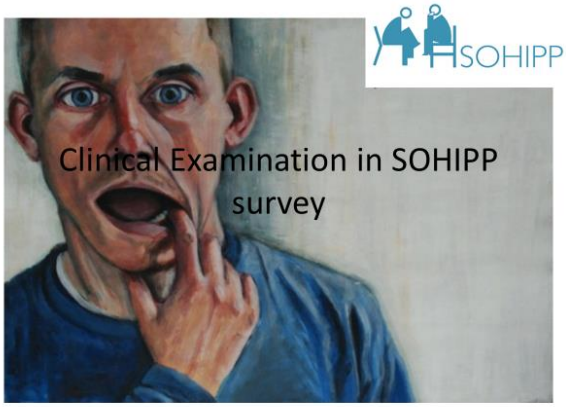
- Consent- 10 minutes/ Participant
- Questionnaire- 20 minutes/ Participant
- Oral Examination- 20 minutes/ Participant

Post- Data Collection

Responsible for data storage, analysis and write up of the results for publication.

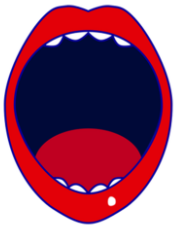
THANK YOU!!

Any Questions??



Components of Clinical Examination

- Soft Tissue Examination
- Plaque Score
- Denture Assessment
- ICDAS- Dental Charting



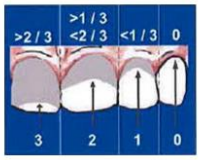
Soft Tissue Examination

	No lesion	Lesion (monitor)	Lesion Refer
Lips	❑	❑	❑
Buccal Mucosa	❑	❑	❑
Tongue	❑	❑	❑
Floor of Mouth	❑	❑	❑
Palate	❑	❑	❑
Fauces	❑	❑	❑

We will be discussing the protocol for potentially suspicious lesions later today

Plaque Score

- Using the Simplified Oral Hygiene Index (OHI-S)
- Numerical score based on plaque coverage of the tooth



Plaque Score

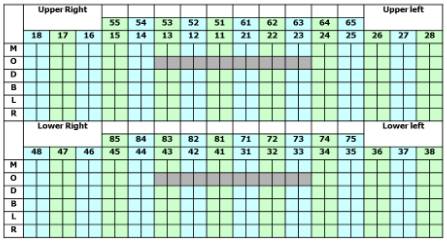
- Score teeth indicated in the table
- Upper molars and incisors- score the buccal surfaces
- Lower molars- score the lingual surface
- Where tooth is not present score adjacent

UR6	UR 1	UL6
LR6	LL1	LL6

Dentures

- Are dentures present?
- If so where? (Upper/lower/both)
- Partial/Complete/Implant
- Material (Metal/Plastic)
- Support (Tooth/Tissue/Both)
- Intact or in need of repair

ICDAS- Dental Charting



International Caries Detection and Assessment System

- Developed to give a simple, logical, evidence-based system
- Can be used at clinical and public health levels
- Based on radiological and histological examinations
- Coronal and root surface caries, along with restoration status

Recording ICDAS- coronal surfaces

- Every surface is given a two digit code (with a few exceptions)
- First is a restoration code, second is a caries code

Restoration	Caries
0-8	0-6

- Teeth replaced with implants have a single code and root surfaces are coded with one digit

ICDAS- Restoration Code

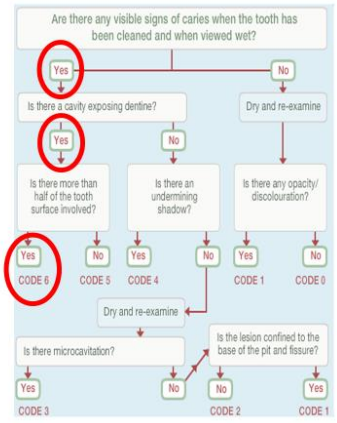
- Recorded in the first box on the template
- 0- Not sealed or restored
- 1- Partial sealant
- 2- Full sealant
- 3- Tooth coloured restoration
- 4- Amalgam restoration
- 5- Stainless steel crown
- 6- Porcelain, gold, PFM crown or veneer
- 7- Lost or broken restoration
- 8- Temporary restoration

ICDAS- Caries Codes

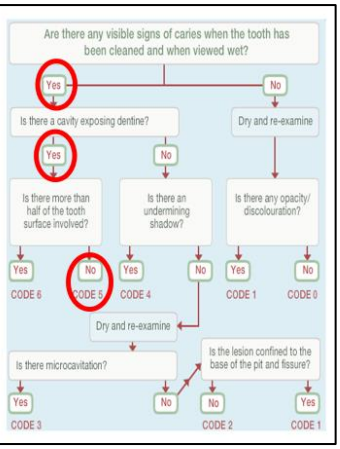
- 0- Sound tooth, no evidence of caries
- 1- Visual change in enamel- can only be seen on a dry tooth, confined to base of pits and fissures on occlusal surfaces, no loss of surface integrity
- 2- distinct visual change in enamel- can be seen on a wet tooth, extends beyond the base of the pits and fissures on occlusal surfaces but no loss of surface integrity
- 3- localised enamel breakdown- as with a code 2 but includes widening of the pits and fissures on occlusal surfaces or loss of surface integrity on smooth surfaces i.e. Micro-cavitation
- 4- underlying dentinal shadow- no gross cavitation in the tooth but a visible dentinal shadow visible on a dry tooth indicating underlying dentinal caries
- 5- distinct cavity with visible dentine- distinct cavity covering less than half of the tooth surface indicating significant dentinal caries
- 6- extensive distinct cavity with visible dentine- cavity covering more than half of the tooth surface indicating extensive caries with likely pulpal involvement

Decision Tree Code 6

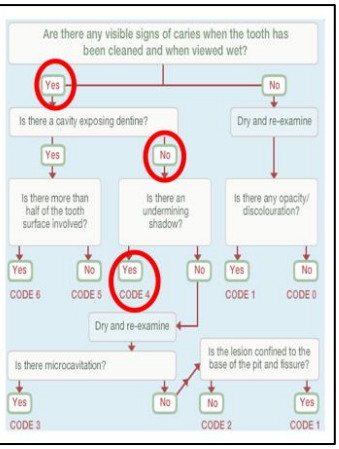
You can identify codes 6, 5, and 4 before air drying the tooth



Decision Tree Code 5

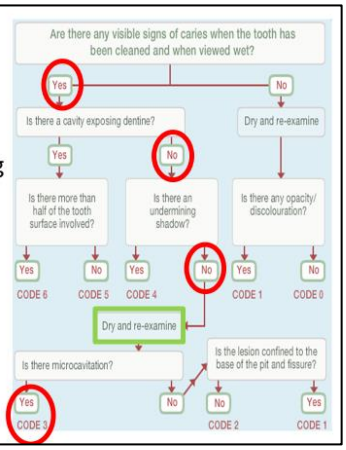


Decision Tree Code 4

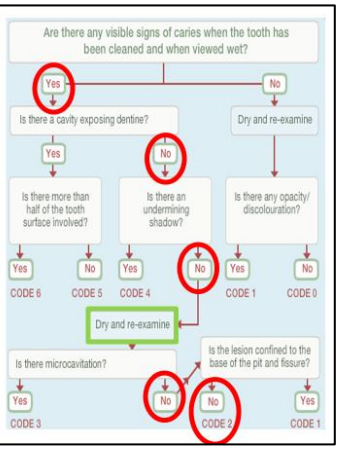


Decision Tree Code 3

Codes 3,2,1 and 0 all require air drying to confirm

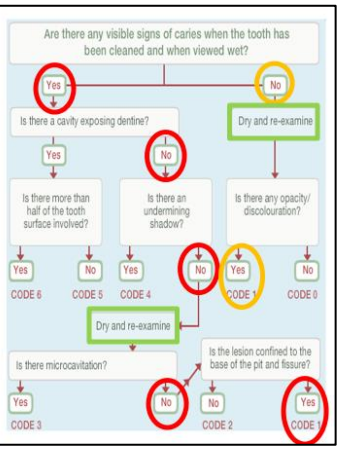


Decision Tree Code 2

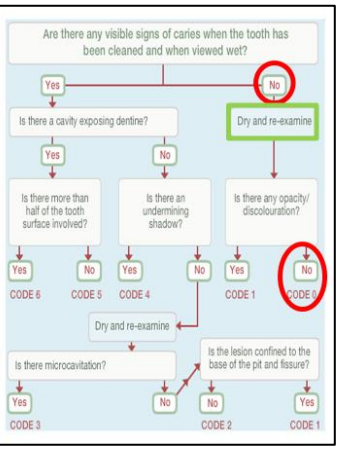


Decision Tree Code 1

Code 1 can be reached through 2 pathways as shown across



Decision Tree Code 0



ICDAS- Missing Teeth

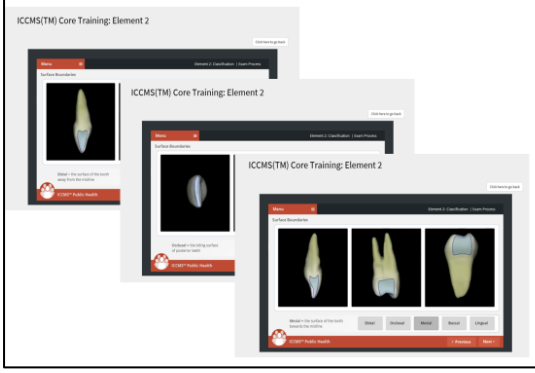
- 97- Tooth extracted due to caries
- 98- Tooth missing for other reasons
- 99- Unerupted
- P- Implant

Input code for all surfaces of the missing tooth

ICDAS- Root Caries

- E- Cannot be assessed
- 0- No discolouration, intact surface or surface loss due to non carious processes
- 1- Clearly demarcated discoloured area but no cavitation
- 2- Clearly demarcated discoloured area with cavitation

Surface Boundaries



Surface Boundaries